MONTANA OUTDOORS

MARCH-APRIL 1974
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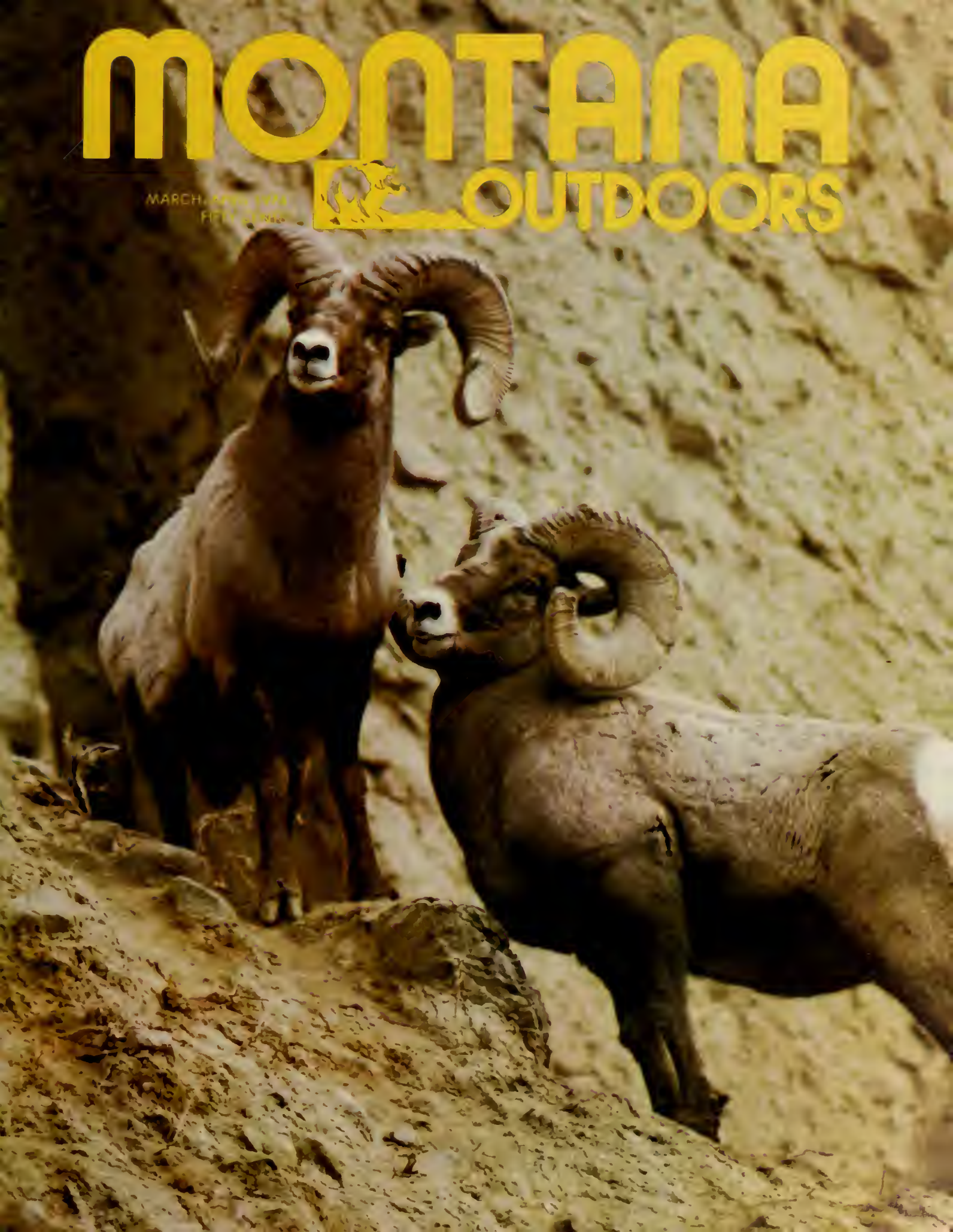

MONTANA OUTDOORS

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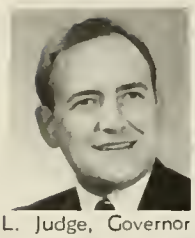

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the cover

The bighorn ram undoubtedly ranks as one of the most awe-inspiring of all big game trophies. Montana still has one of the nation's largest populations. But the bighorn's continued existence depends on a unique habitat explained by biologist Al Schallenberger in the cover article, beginning on page 2. Cover photo by Gus Wolfe. Special thanks to the National Wildlife Federation for the colorful tribute to endangered wildlife—featuring the wolf—appearing on the back cover.

ASHTON S

features

2 meet the mountain sheep

a tale of bighorns, bunchgrass and broken terrain. by Al Schallenberger

11 vote for your favorite fish

George D. Holton asks montanans if they want a state fish and, if so, which one

12 a grazing system for wildlife

Joe Egan describes a livestock grazing system that benefits both wildlife and domestic stock

15 the bicycle

can it ever be the fisherman's best buddy? our second outdoor recreation guide. by Harmon Henkin

31 singing a song for unsung wildlife

we thought it was about time we said something for nongame wildlife

departments

1 director's column
7 the catchall
23 dear F&G
26 book reviews
27 classroom conservation
30 editorial

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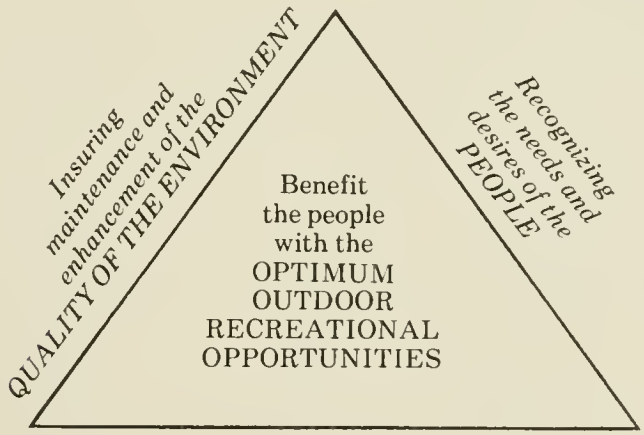
a livable environment for WILDLIFE is a quality environment for MAN

Nearly 3 of 5 Montanans (ages 15-65) purchase a hunting or fishing license and many others enjoy a wide range of nonconsumptive outdoor activities. This demand for outdoor recreation and people's need to fulfill their leisure time with beneficial outdoor activities promises to accelerate in the future.

To prepare for this challenge, the Department of Fish and Game has embarked on a long-range comprehensive planning effort to insure optimum use of Montana's wildlife and other natural and cultural resources that provide outdoor recreation. "Optimum use" is defined as the point at which the most significant benefits are delivered without jeopardizing the capability to continue to do so in the future.

We must plan for the wise use of those resources necessary to continue a high quality and quantity of outdoor recreation, with diverse choices, as a way of life for Montanans and their visitors.

The first step in planning has been to identify the overall department goal for the future. We are presenting here for review by the people the following concept and goal statement:


Insuring maintenance and enhancement of the QUALITY OF THE ENVIRONMENT
Recognizing the needs and desires of the PEOPLE
Benefit the people with the OPTIMUM OUTDOOR RECREATIONAL OPPORTUNITIES
Consistent with the capabilities and requirements of the RESOURCES

GOAL OF THE MONTANA DEPARTMENT OF FISH AND GAME

To benefit the people of Montana and visitors with the optimum outdoor recreational opportunities; emphasizing the tangible and intangible values of wildlife and the natural and cultural resources of aesthetic, scenic, historic, and archaeological significance, in a manner:

(1) *consistent with the capabilities and requirements of the resources,*
(2) *recognizing present and future human needs and desires and*
(3) *insuring maintenance and enhancement of the quality of the environment.*

Wes Woodgerd

Wes Woodgerd, Director
Department of Fish and Game

BY AL SCHALLENBERGER

MEET THE MOUNTAIN SHEEP

The bighorn sheep—often called "the mountain sheep." photo by Jon Cates

A HOLLOW, CRASHING sound filled the little mountain valley and the echo bounced back from the steep cliff opposite me. I searched the rugged terrain carefully with binoculars and found a group of bighorn rams competing for a bighorn ewe's attention. The hollow crash came from the tremendous impact with which the rams struck each other—head-on. They collided with such determination that one had splintered, "broomed," horn tips and several had facial cuts.

This was the bighorn breeding season, which extends from mid-November through December. Afterward, the older and larger males leave the young rams, ewes and lambs, and avoid the big herds until the next autumn. On the wintering areas, small herds of older rams inhabit the most rugged terrain.

With one exception, bighorns are gregarious throughout the year. In May and June, after approximately 180 days gestation, ewes seek solitude in cliff areas and give birth to a single lamb and, on rare occasions, twins. The lambs walk shortly after birth. Within a few days their mothers rejoin other ewes and lambs. The lambs already have learned to navigate tough terrain and have a great time racing about the steep cliffs. As the lambs age, the ewes pay less attention, allowing them to roam further from the cliffs. If the lambs survive this first critical year, they haunt some of Montana's more rugged places for 12 or 13 years—just as they have for many decades.

Early explorers such as Lewis and Clark saw bighorn sheep in rugged cliffs along the Missouri and Yellowstone rivers and recorded the observations in their journals when they explored in the early 1800s the land that became Montana. Other early records indicate wild sheep inhabited rugged terrain from the Finger and Chalk buttes of southeastern Montana to mountains on the Wyoming and Idaho borders, north to the mountains of western Montana and the Sweetgrass Hills of north central Montana on the Canadian border.

Most of the isolated mountain ranges east of the Continental Divide—the Highwood, Little Belt, Judith, Big Belt, Crazy, Bearpaw and Bull mountains—supported bighorn herds when white men first settled the country.

Bighorns apparently flourished in these areas for thousands of years,

continued

An inhabitant of high places. photo by Jerry Manley

A young bighorn and a gnarled conifer—harsh testimony of the sheep's rugged existence. F&G photo by Al Schallenberger

becoming well adapted to bunchgrass ranges in rugged terrain. Bunchgrasses commonly grazed include bluebunch wheatgrass, Idaho fescue and rough fescue. (See drawing on page 4.) However, in some areas of Montana, bighorns have disappeared. Since they are good indicators of habitat condition, we must ask why.

Why did herds that thrived for thousands of years suddenly vanish around the turn of the 20th century? Was the disappearance natural or man-caused? If the latter is true, can man "remanipulate" the habitat and bring back the bighorn?

bluebunch wheatgrass

Recent Montana research has increased knowledge of bighorns and their habitat. Nearly all studies emphasize the importance of bunchgrasses in the bighorn diet—especially during the fall and winter.

When icy, crusted snow covers bunchgrass, bighorns often survive on palatable browse like serviceberry, chokecherry and mountain maple. Research indicates the animals rely on sunny, windswept slopes in winter. And throughout the year, they are generally found on or within a few hundred yards of extremely steep terrain. Are these eating and habitat requirements a clue to their disappearance in many areas?

John Stelfox, in a history of Alberta bighorns, noted that early records invariably reported preferences for bighorn meat over other wild game. Was overshooting, then, the prime reason for vanishing herds in Montana? In isolated cases, near concentrations of humans such as mining camps, shooting bighorns for food may have contributed to their decline; however, hunting was probably not the major cause for reduced numbers in most areas.

It was believed that early reductions in bighorn herds were caused by parasites—especially scabies mites and lungworms—contacted from domestic livestock and resulting in sickness and death. This myth persisted for years and resulted in wasted time, effort and money. The animals coexisted with disease and parasites for thousands of years without any help from man. The disease-parasite myth deterred bighorn management because it centered efforts on curing symptoms rather than examination of the basic cause of declining wild sheep populations.

Over the years, bighorns adapted to grassland in rugged terrain and successfully escaped predators. But nothing in their specialized existence prepared them for white men.

Lewis and Clark and early fur trappers and traders reported a vast region of grass, available for the taking. Wild animals, including bighorn, were abundant. After the fur trapping era, ranchers drove herds of livestock to Montana to feed on the supposedly infinite grass supply. Glowing reports by the first settlers accelerated settlement, and ranchers competed to see who could grab the most land and raise the most livestock. Excessive grazing by domestic livestock eliminated bighorns from much of their habitat.

Before ranchers realized land and grass were not limitless, livestock die-offs had already occurred, and bighorns perished in many areas and rapidly approached extinction in others. The last live Audubon's bighorn, a subspecies adapted to the breaks of eastern Montana, was seen in 1916 along Billy Creek in north central Montana.

To further complicate the bighorn's life, the settlers wished to protect their houses, barns, fences and other improvements from everything—including fire. By 1900, successful suppression methods were developed. No longer was fire tolerated. Natural fire cycles in mountains, important for perpetuating grass and browse, were disrupted. Old pictures of mountain areas show open spaces suitable for bighorn sheep habitat. Today, many of these areas are dense coniferous forests. To some, the trees represent potential lumber. Others see trees as consumers of nutrients and energy which natural fires previously converted into forage for wild animals. Smokey Bear is not a friend of the bighorn sheep.

Continued heavy grazing by domestic livestock resulted in (1) destruction of bunchgrasses necessary to bighorns and (2) a corresponding increase in plants relatively unpalatable to bighorns and domestic livestock. Some of the invading plants were, however, accepted readily by more adaptable mule deer. In a number of cases, mule deer increased markedly and competed with bighorns for palatable browse. This was documented by Steve Berwick in his study of the Rock Creek herd in western Montana. In most cases, where bighorns were forced to compete with deer, elk or domestic livestock, the wild sheep began to die off.

In spite of their many troubles, bighorns still haunt scattered portions of western Montana—areas which have retained some of their pristine character. (See figure 1.) And a few transplanted bighorns are still found in the Missouri Breaks of central Montana and in the Blue Hills of eastern Montana. The future of some of the small native and transplanted herds is in doubt due to deteriorated habitat and competition from other grazing animals.

But the Sun River herd, one of the largest in the nation, appears to be thriving on most of its range. The herd may be increasing to a point that could mean range damage in some areas. Since 1953, over 1,000 bighorns have been removed from the Sun River population by hunting, trapping and transplanting. Since 1967, the trapping-transplanting operation has been intensified and 299 bighorns have been moved to other parts of Montana.

Many attempts have been made to restock original bighorn ranges through transplanting, several of which failed because too few animals were transplanted to establish a population. In other instances, animals moved in spring dispersed widely over the transplant area and did not occupy potential winter range. And in a few situations, animals introduced to winter range in winter lived there the entire year. When bighorns spend the entire year on winter range, the entire herd may perish if the range is overgrazed.

Migratory patterns established by resident bighorns are completely new to transplanted animals. Perhaps transplanted animals cannot, in a few years, learn a migration pattern developed over many generations by native bighorns. Migration evolved to best utilize available seasonal range, so animals which did not successfully use their range probably perished.

continued

Two large rams in a typical high mountain setting. photo by Jon Cates.

As with other big animals, the bighorn's winter life often becomes a constant struggle. F&G photo

The trophy—a full-curl ram. photo by Jerry Manley

In the Sun River region, about 100 bighorns, marked with individually coded collars and ear tags, used the same winter ranges (with few exceptions) each year. Research in Alberta and Idaho indicates similar range use in winter; the young apparently learn migration routes from older animals. Successful bighorn management should therefore include protection of the migratory instinct of native herds.

Transplanting bighorns to former ranges has not always been successful. Transplanted herds have little chance of success if conditions which caused elimination of the original population still persist. They have the best chances if sites have been carefully studied before and after transplants. All transplants should be individually marked so success can be more accurately determined. After a site has failed several times, it should be abandoned.

The Bureau of Land Management and the Forest Service control many bighorn ranges. Livestock grazing and fire suppression practices of these agencies have a profound influence on the bighorn's success. Livestock range improvements—such as placing a water tank on a steep inaccessible ridge—may not be an improvement for bighorn sheep. Bighorns have been able to survive in some instances because steep slopes were not heavily grazed by domestic livestock. But now that the water tank attracts livestock to the area, it becomes heavily overgrazed—a common occurrence around water.

In recent years, die-offs of bighorn sheep occurred in the native herd on Rock Creek near Missoula and in transplanted herds on Wild Horse Island in Flathead Lake and in the Missouri Breaks north of Lewistown. The reason? Inadequate forage.

Problems with bighorn range are not unique in Montana. Colorado's Tarryall herd suffered a severe die-off in the 1950s. British Columbia lost an estimated 3,200 of 4,000 (80 per cent of population) bighorns in the East Kootenay region in the 1960s. Since overgrazed range caused these recent die-offs, the same probably holds true for earlier die-offs.

In the 20th century, hunters have traditionally harvested only larger male bighorns, which opposes practices for most other big game. Ranchers neither sell their larger bulls each year nor do they permit livestock herds to increase without controlled harvest. Obviously the cattle would overgraze pastures and die. The same goes for bighorn sheep confined by specialized habits to range supporting bunchgrasses on, or immediately adjacent to, rugged terrain.

Through the U.S. and Canada, illegal poaching and high prices for large rams (over $2,000) have caused concern about wild sheep hunting in which, traditionally, only large males are killed. Some hunters are afflicted by a tremendous desire to get a "grand slam" (large males from four varieties of North American wild sheep). Some even race from one hunting camp to another, trying to accomplish the feat in one year. Others have a strong urge to get their name listed in the Boone and Crockett record book. The trophy disease affects some hunters so badly they are willing to cast aside all normal hunting standards to achieve their goal. If such hunters were more concerned about maintaining wild sheep habitat and populations, enjoyment of the hunting trip, competition with the terrain, the weather and the wild sheep themselves—the artificial competition of the "grand slam" would have little meaning.

FIGURE 1: Montana bighorn sheep ranges.

Forty either-sex permits have been issued for bighorns in the Sun River area the past two years. The either-sex seasons were recommended to start people thinking about the female population. Results from Alberta hunting seasons indicated few females were taken because the hunters still selected the largest ram they could find.

That's exactly what happened with two years of either-sex seasons in the Sun River area. Average ram horn measurements were the same as for the most recent three-fourths curl season (1971). Two important differences were noted. Hunters no longer wore a worried look when they stopped at the checking station to measure their bighorn. They had a more enjoyable hunt with no apparent damage to the bighorn populations. Also, the either-sex seasons pointed to the need for ewe-only permits to control bighorn populations.

The bighorn has declined in number and distribution throughout its original range in Montana. Research shows that the animals are closely tied to grassland ranges associated with steep, rugged terrain. History indicates bighorns die when ranges are decreased or abused by overgrazing—both by domestic livestock and by wildlife (including the bighorn itself). Overgrazing by bighorns indicates that hunting of large rams only is outmoded and that females must be taken to control populations. Trapping and transplanting bighorns will be unsuccessful if the conditions which caused the die-off still persist in the transplant area. Natural fires have not been allowed to play their role in converting forest to successional stages of grassland that the bighorn requires.

Die-offs and decreased distribution of bighorn sheep can be expected in the future unless bunchgrass ranges and bighorns receive at least *equal* consideration when resource uses are planned.

THE CATCHALL

endangered wildlife

Because of increasing concern for wildlife—especially endangered wildlife—the National Wildlife Federation adopted "We Care About Endangered Wildlife" as its 1974 theme. (See back cover.)

How does wildlife become endangered? Some people blame hunters. But a recent report of the Bureau of Sport Fisheries and Wildlife indicates exactly the opposite. Not one of the 104 species on the BSFW's list has been endangered by "regulated harvest" (hunting seasons based on management facts gathered by wildlife managers). *Not one!*

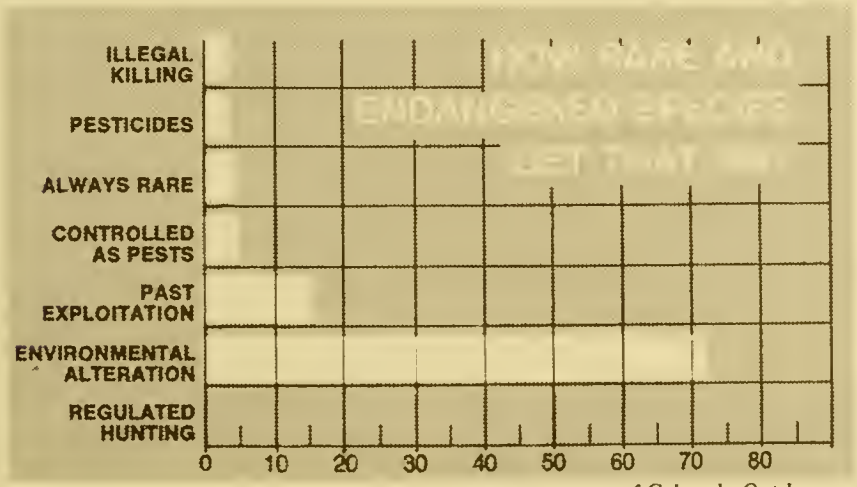
Some say the buffalo was nearly "hunted" to oblivion and also the passenger pigeon and heath hen.

However, the buffalo's doom was probably sealed—even if man had never invented gunpowder. Durward L. Allen, in his highly regarded book, "Our Wildlife Legacy," put it like this: "The final arbiter of his [the buffalo's] destiny was the fertility of his native range. He had to pass because of changed conditions. And yet we know that the great herds would have been wiped out whether or not plow ever broke the prairie sod. The killing was calculated."

If sport hunting poses a threat to wildlife, our most popular game species—elk, deer, grouse, pheasants, etc.—would have disappeared long ago. Instead they have stabilized and in many cases, prospered.

For example, take deer, the nation's No. 1 game animal. Every year, U.S. hunters bag nearly 2 million deer (about 100,000 in Montana). Today, deer—mule and white-tailed—must be as far from endangered as limits allow.

So if hunting isn't the culprit, why do animals become endangered? Several reasons exist, but as the accompanying chart aptly points out, "environmental alteration" causes most. Of the 104 species, 72 made the list because of man-caused habitat changes. Most of the 72 have rather fragile and specialized habitat requirements, so they are especially vulnerable.



courtesy of Colorado Outdoors

A few persons wonder about all this fuss over endangered wildlife. "Who cares about an ivory-billed woodpecker or a California condor or a greater prairie chicken?" they ask. "I've lived this long without seeing one, so I wouldn't even know if it was extinct."

To answer, remember the "miner's canary" concept. Before mining technology made it unnecessary, underground miners took a caged canary with them to the depths. If the canary died, they hurried to the surface, knowing they could be next. Today, all wild animals—especially endangered wildlife—are "miners' canaries."

If the greater prairie chicken became extinct, it wouldn't be taps for the human race. But it's a small step in that direction because man's environment has become a little less livable.

This, incidentally, is why all wildlife (game and nongame) is so important.

THE ENVIRONMENTAL PEACE CORPS

During the past two years, developing foreign countries have substantially increased requests for Peace Corps volunteers to work on environmental programs. Already the Smithsonian Institution-Peace Corps Program has placed hundreds of volunteers in natural resource and ecological research positions overseas.

If you're interested, contact Dr. James A. Sherburne, Office of Ecology, Smithsonian Institution, Washington, D.C. 20560.

STOPPING CLEARCUTTING IN WEST VIRGINIA

A recent West Virginia district court decision could—if appeals fail—end clearcutting nationwide.

The Natural Resources Defense Council, Sierra Club and West Virginia Izaak Walton League were successful in a suit to stop

continued

the controversial timber cutting method. Some feel the decision may become precedent in all federal forests.

Judge Robert Maxwell ruled that federally owned trees can't be cut until they're dead or matured. (Normally, clearcut logging removes all marketable trees.) His decision stopped clearcutting in the Monongahela National Forest.

In the suit, the three conservation groups claimed the Forest Service violated the Organic Act of 1897. The groups said this act allows only dead, mature or large growth timber to be cut from national forests.

Apparently, Judge Maxwell agreed.

DAMMING RIVERS IN GEORGIA

Gov. Jimmy Carter (D-Georgia) has recommended that the $133 million Spewrell Bluff Dam *not* be built. He is convinced that "among Georgians not motivated directly by financial profit, a heavy majority oppose construction of this dam and other similar projects." According to the National Audubon Society, Carter is the first governor to take such action.

BANNING THE CAN IN VERMONT

Vermont and Oregon have enacted ban-the-can legislation, requiring deposits on beer and soft drink containers.

In Vermont, beer and soft drink retailers, distributors and container manufacturers don't like the law. They enjoyed the convenience of nonreturnable containers. And now Vermont Gov. Thomas Salmon has charged that the container representatives have hiked their beer prices by as much as 50 cents per six-pack, hoping the public will blame the increase on the nonreturnable container ban.

Gov. Salmon isn't giving in. He supported enforcement of the bottle bill and refused to call a special session in 1973 to repeal the law, even though he was pressured by the Vermont Retail Grocers' Assn. to do so. He also thinks the bill's opponents may use their bully tactics to try to get the measure repealed when the legislature convenes in 1974.

BECAUSE BOTH WOULD LOSE

During the 1973 hunting season, the Meagher County News printed up hunting permission slips which were *free* to landowners who wished to use them.

The reason? "To aid both the rancher and sportsman, and because we believe that BOTH sides have a lot to lose if a rational middle ground is not reached in this conflict."

BICYCLE BRIEFS

Congressman Ralph S. Regula (R-Ohio) has introduced a bill into the U.S. House of Representatives to create a cross-continental bicycle trail park.

In 1972, the bicycle embarrassed Detroit and outsold the automobile.

But October 1973 left the auto makers even more humiliated. During the morning rush hour, 10 bicycles and 10 cars raced various routes from the outskirts of Washington, D.C. to the downtown area. The bicyclists defeated

SPRINGBOARD

"Somewhere between the dark age and the age of plutonium glowing in the dark, environmentalists have raised the hope of stable, ecological sanity, an age of windmills and solar-heated homes, of bicycles and railroads and gardens on rooftops, of free and happy people who don't need Consolidated Edison, General Electric or the Atomic Energy Commission. Stable populations and production planned in harmony with nature are possible goals, though they are contradictory with many goals of industrial growth. Those who have faith in this promise, far from being sterile pessimists or fools, are the true optimists of our time."—Charles Bering, in *Environmental Action*

The following appeared in the Winter 1973 issue of the Montana Chamber of Commerce publication, Montana Citizen:

"The Senator from Tax Gulch"

For those of us too old to cavort in winter's snow, whose idea of winter recreation is to listen to a crackling fire in the fireplace, the days of winter are days to reflect. Consider the current talk of an energy crisis. If there really is a crisis, who or what caused it?

Some folks might point an accusing finger at industry, some toward wasteful consumers and fancy living, some at the Arabs. Nobody seems to want to cast rueful eyes toward the combine that ought to be blamed—that combination of radical environmentalists and demagogic politicians.

There were folks who tried to send out warning signals, surely the business community and the state chamber shouted warnings. I remember when the chamber spokesmen were getting black headlines for being obstructionists. Some aspiring politicians mistook the shouts of the few as the roar of the majority—common enough practice these days.

My ranching days proved to me long ago that the practice of following bell ringers most often led to the ride toward disaster.

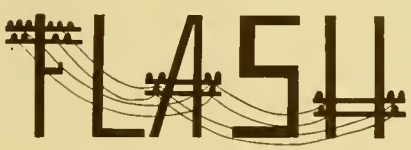
FOR DISCUSSION

the car drivers in 9 of 10 challenges. (The other one was a tie.)

As it is in several environmental matters, Oregon seems a step ahead—or should we say "pedal" ahead—on the bicycle issue. The 1971 legislature approved legislation that allowed Gov. Tom McCall to name an eight-member advisory committee on bicycles to work with Highway Department officials. (One of the eight must be under twenty-one.) The legislation also sets aside one per cent of highway trust fund monies for construction of footpaths and bicycle trails.

NEWSPAPER SEIZED

An issue of Ketchum Tomorrow, a free weekly newspaper in Ketchum, Idaho, was recently seized in bundles from newsstands in a nearby town. Apparently, the action came because the paper contained an editorial attacking prodevelopment candidates for city offices.



When construction crews finish, part of the Denver Community College campus will be heated by sun power. This solar unit requires no cross-country transmission where losses of electricity sometimes are as much as 15 per cent.

An amendment to the proposed federal law, the Surface Mining and Reclamation Act, withdraws coal deposits owned by the federal government from possible strip or open pit mining when the surface above the deposits is owned by someone else. The amendment, sponsored by Sen. Mike Mansfield, already passed the Senate.

Approximately 800,000 Montana acres and more than 1 million acres in Wyoming are already under coal leases.

Because of the purported energy shortage, wood-burning stoves are a rare commodity. If you've had one rusting in the backyard for several years, its present worth will shock you.

New slogan for the Seattle Light Co.—"KILL-A-WATT."

The U.S. contains 40 per cent of the world's coal reserves.

continued

HOW TO SUBSCRIBE TO MONTANA OUTDOORS

rates and special offer: one year (6 issues)—$2, two years (12 issues)—$4, three years (18 issues)—$6. Each additional year—$2 more. All three- (or more) year subscriptions receive two full-color, ready-to-frame Montana wildlife prints—free! With gift subscriptions, both the donor and the recipient receive the prints. We have a very limited supply of these prints, so they must go on a first-come, first-served basis.

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After completing this form, clip it and mail to *Montana Outdoors*, Dept. of Fish and Game, Helena MT 59601. Please make all checks payable to the Montana Dept. of Fish and Game.

sure-fire logs

What to do with old newspapers is a problem not yet completely solved by Montana's recycling centers. At this writing, centers in Missoula, Billings, Great Falls, Bozeman and Butte do accept newspapers. Other centers don't.

After you wash your windows, line your drawers and fill up every corner with papier-mâché figures, what do you do with that five-foot pile of old newspapers in your basement?

You might make fireplace logs. Roll the newspapers, beginning at the bottom, until you have a roll at least six inches in diameter. (A big Sunday edition or several daily issues should do the trick.) Keep the log from unrolling by rolling it *diagonally* across two sheets of newspaper, spread out completely. As you roll, tuck in each end of the covering pieces.

Your paper log burns slowly, as surprising as that may seem. And it stretches out a winter wood supply.

Paper logs also solve another problem—what to do with used oil. We've heard that soaking the paper logs in the old oil will make them burn more easily. They also smoke a bit, so try it first in a garage stove or other outdoor heater.

DO YOU OWN LAND BETWEEN COLSTRIP AND HOT SPRINGS, MONTANA?

If so, you must read the following

Montana Power Co. plans to build two 500 kilovolt transmission lines from Colstrip to Hot Springs. Montana's largest utility already submitted two permit applications to the State of Montana for the lines.

If you own property along a convenient route between these two small Montana towns, MPC—through its agent, Universal Field Services, a Billings firm—may be attempting to secure a right-of-way across your land.

Don't be rushed into granting the right of way. Time is on your side.

The proposed lines fall under provisions of the 1973 Utility Siting Act. This act requires a 600-day processing period before the permits can be granted. *The decision to build or not to build and perhaps where to build has not been made.* Yet, MPC has been trying to acquire a right-of-way for at least five months. In theory, the power company doesn't even know *where* it will be *allowed* to build the line or whether it will be allowed to build it *at all*. The decision can't be made until Jan. 11, 1975.

We learned of this just before press time, so unfortunately we couldn't report on it more thoroughly. However, watch a future issue for full details on the proposed transmission lines.

Until then, don't sign before you've dug out all the facts. We suggest contacting the Northern Plains Resource Council, 421 Stapleton Bldg.; Billings, MT 59101, (406) 259-6114.

And remember, for once, time is on your side. Even if you do decide to sell the right-of-way, a delay may net you a much better price.

Did you miss it?

Last issue, we promised part two of the editorial report, "The Subdividers are Here!" But after a second thought, we decided to wait until after the Montana Legislature.

This allows us to incorporate the sure-to-come legislative action into the article. Otherwise, we would only be "guessing" about what the lawmakers will do with this serious environmental issue.

Please stay tuned. Part two will appear in the May/June 1974 issue.

VOTE FOR YOUR FAVORITE FISH

By George D. Holton

LATELY, THE POSSIBILITY of naming a state fish has generated considerable interest. Last September's Sport Fishing Institute Bulletin contained a list compiled by outdoor writer George L. Marzeck, of states that either legally designated state fish or actively seek to designate one. In November, one of John Willard's weekly Outdoor Montana newspaper columns was entitled, "How About a State Fish?" And in December, a Capitol Comment column in Fishing and Hunting News (Montana edition) was a tongue-in-cheek commentary on state fish by Fritz Schumann.

Every state has a state tree, bird and flower. (Montana's are ponderosa pine, meadowlark and bitterroot, respectively.) According to the "The Book of the States" prepared by the Council of State Governments, Oklahoma even has a state reptile and Nebraska a state fossil. The last Montana Legislature passed a bill making bluebunch wheatgrass the official grass. One's first response might be "good grief." But after a little contemplation, it's not a bad idea. Grass (not the smoking type) is the foundation of Montana's livestock industry, and it is time to recognize its importance now that strip mining for coal is intensified in the eastern portion of the state.

In the same vein, perhaps the importance of Montana fish should be recognized since fishing is a major recreational pursuit for state residents and an important attraction of the state's tourist industry. About 350,000 people fish in Montana each year.

STATE FISH

States that either have legally designated state fish or are actively seeking to designate one (adapted from Sport Fishing Institute Bulletin No. 248, Sept. 1973):

Alabama—tarpon (1955)
Alaska—king or chinook salmon (date unknown)
Arkansas—largemouth bass (1967 or 1968)
California—golden trout (1947)
Illinois—bluegill (not official, 1972 bill not acted upon)
Iowa—channel catfish (not official, 1972 bill not acted upon)
Kentucky—Kentucky or spotted bass (1958)
Maryland—striped bass (1962)
Michigan—brook trout (date unknown)
Minnesota—walleye (1965)
New Mexico—cutthroat trout (1955)
North Carolina—channel bass or red drum (1971)
Ohio—smallmouth bass (not official, but often reported as such)
Oregon—chinook or king salmon (1971)
Pennsylvania—eastern brook trout (1970)
Washington—steelhead trout (1969)
Wisconsin—muskellunge (1955)
Utah—rainbow trout (1971)

THE NOMINEES

What if Montanans were to name a state fish? What standards should be used? First, I would suggest a game fish native to the state. Nine fish meet this criteria: white sturgeon, paddlefish, mountain whitefish, pygmy whitefish, cutthroat trout, Dolly Varden, lake trout, Artic grayling and sauger. Second, the fish should preferably be one not already adopted as a state fish by another state. Third, the fish should be popular with sportsmen.

At the risk of biasing the outcome, I propose as candidates the paddlefish, Dolly Varden and Arctic grayling. All three lived here thousands of years before European man set foot on North America, and one—the paddlefish—long before that.

ANCIENT PADDLEFISH

As pointed out by Al Elser in an article on paddlefish (*Montana Outdoors*, May/June 1973), fossil remains indicate that paddlefish have existed in this area about 60 million years. In Montana, they are found in the Missouri and Yellowstone River drainages. Although the Missouri-Mississippi River drainage outside the state also has paddlefish, distribution is limited, and in many waters continued existence is threatened by dams and other man-caused changes. Snagging is legal in Montana because paddlefish are not readily caught with bait or lures. They are large, from 12 pounds to 142½ pounds, the state record. A long paddle-shaped snout comprises as much as one-third of the total length.

GRACEFUL DOLLY VARDEN

While the paddlefish is restricted to the Missouri

continued

and Yellowstone, Dolly Varden (or bull trout) are found only in the Columbia and Saskatchewan River drainages. Color varies with the lake or stream and the fish's maturity. Under favorable conditions, they have yellow spots on the back, orange to red spots on the sides and orange-tinged fins with white borders. These bright colors prompted the name Dolly Varden. (Dolly Varden was a young lady in Charles Dickens' novel, "Barnaby Rudge," who wore colorful dresses.) Montana's largest Dolly Varden come from the Flathead River drainage. Here, they usually run six to seven pounds (unofficial Montana record: 25½ pounds). Dolly Varden hold the Montana record for length of spawning migration. One tagged fish traveled 118 miles from Flathead Lake to a remote tributary. In the past, Dolly Varden have been condemned as voracious fish eaters and cannibals. However, they probably are no more so than other trout of equal size. As the role of predation in nature has been better understood, Dolly Varden have taken their place as valuable Montana game fish.

ARCTIC GRAYLING

LADY OF THE WATERS

Although numerous in Alaska and northwestern Canada, the Arctic grayling was native in only two lower states, Montana and Michigan. It became extinct in Michigan in the 1930s. Habitat deterioration and competition from introduced species have so reduced the number of grayling waters in Montana that the U.S. Bureau of Sport Fisheries and Wildlife includes Arctic grayling in its "Red Book" of threatened fish and wildlife. The grayling's early distribution in Montana was mainly in streams. But few streams adequately support it now. However, thriving populations are found in 25-30 lakes in the western and south central part of the state. Even though many of these are outside the original grayling range, successful transplants have established populations. Artic grayling have also been planted in several other states, mostly in the West. But in the lower 48 states, they are uniquely a Montana fish. Dr. C.J.D. Brown, who recently retired from Montana State University after many years as a distinguished teacher, fisheries researcher and author of numerous publications on fish including "Fishes of Montana," has urged selection of the Arctic grayling as our state fish. Although grayling are smaller than the other candidates—the largest known from Montana was 2½ pounds—their large colorful dorsal fin makes them a beautiful and distinctive candidate for the state fish.

We very much would like to know our readers' feelings about what fish should be our official state fish—or if we should have one at all. If you have any ideas on this, please fill out the following form and send it to *Montana Outdoors*, Department of Fish and Game; Helena, MT 59601.

SHOULD MONTANA HAVE A STATE FISH?

If you have some thoughts on this, we would like to know. Simply fill out this form and send it to *Montana Outdoors*, Department of Fish and Game; Helena, MT 59601.

Do you think there should be a state fish?

☐ yes ☐ no

If so, which fish would you want?

☐ paddlefish
☐ Dolly Varden
☐ Arctic grayling
☐ other (please specify) _____

_____

editorial

a grazing system for wildlife

Most livestock grazing systems have one goal—to produce the highest financial return. Whether that return is short-term or long lasting depends on the system and its manager.

Recently, such single-purpose management—especially on public lands—has received its share of badmouthing. As a result, many grazing plans now contain the phrase, ". . . and it's good for wildlife."

"Wildlife" means birds, mammals, reptiles and fish, and, of course, feeding habits of all species differ. When tacking on this phrase to assure readers of the plan's multiple purposes, planners sometimes forget to mention *which* wildlife species is benefited—and how. We think these planners should look up the definition of "lip service."

When tempted to add that phrase, land

managers should first ask, "What is it that's *good* for *which species* of wildlife?" In pursuing the answer, the manager may conclude he was about to say something which is unsupported by fact.

At this point, the planner is probably asking, "What livestock grazing system can benefit wildlife?" The best answer, to date, came in 1970 from Gus Hormay of the Bureau of Land Management: rest-rotation grazing.

In a report about this grazing system, Hormay wrote, "High-level production of livestock and other values on western rangelands depends on the production of desirable, vigorous plants on the entire range." Previously, he noted, a major factor in the deterioration of these plants was overstocking. Many managers, after acknowledging the need to preserve range productivity, reduced their herds hoping to bring back the plants. "However," Hormay points out, "assumption that plants can be grazed to a proper level through regulation of stocking is unrealistic because of the grazing habits of livestock."

Instead of using the vegetation uniformly, grazing animals concentrate on more desirable plants. Thus, according to Hormay, animals "consistently graze the more palatable plants and accessible areas closely and, invariably, beyond proper-use level . . . . So under continuous grazing at any stocking level, the more palatable and accessible plants are gradually killed out."

His solution to this dilemma breaks up this continuous use by "resting" parts of the range. Under this system, the land is divided into pastures or units which are systematically rested. Not only does this system give plants a chance to recover their vigor, it also allows seeds to ripen and seedlings to establish. The result is a more productive range for domestic livestock *and* wildlife.

To illustrate, consider this generalized formula for a grazing system to benefit a desirable plant in the Missouri Breaks, bluebunch wheatgrass. Assuming the land manager establishes or sets up four similar fenced pastures in the system, he could plan his long-term grazing policies like this:

FIRST YEAR

Pasture A Rest (don't graze at all this year)	**Pasture D** Rest to allow seedlings to become established and graze for only a short time in fall
Pasture B Graze, but only after seeds are ripe (maybe July 15) so the cows will trample and "plant" the seeds	**Pasture C** Rest until root growth is complete (maybe July 1), then graze

SECOND YEAR

Pasture A Rest to allow seedlings to become established and graze for only a short time in fall (same as D the year before)	**Pasture D** Rest until root growth is complete (maybe July 1), then graze (same as C the year before)
Pasture B Rest (don't graze at all this year) (same as A the year before)	**Pasture C** Graze, but only after seeds are ripe (maybe July 15) so the cows will trample and "plant" the seeds (same as B the year before)

THIRD YEAR

Pasture A Rest until root growth is complete (maybe July 1), then graze (same as D the year before)	**Pasture D** Graze, but only after seeds are ripe (maybe July 15) so the cows will trample and "plant" the seeds (same as C the year before)
Pasture B Rest to allow seedlings to become established and graze for only a short time in fall (same as A the year before)	**Pasture C** Rest (don't graze at all this year) (same as B the year before)

FOURTH YEAR

Pasture A Graze, but only after seeds are ripe (maybe July 15) so the cows will trample and "plant" the seeds (same as D the year before)	**Pasture D** Rest (don't graze at all this year) (same as C the year before)
Pasture B Rest until root growth is complete (maybe July 1), then graze (same as A the year before)	**Pasture C** Rest to allow seedlings to become established and graze for only a short time in fall (same as B the year before)

(*A grazing allotment*—can be virtually any size—depending on vegetation type, land ownership, etc.—*Ed.*)

A land manager who is concerned about wildlife on the land he manages (in the case of public land, laws dictate that concern) can plan a similar system to benefit wildlife habitat. For example, rabbitbrush is a prime mule deer browse plant in eastern Montana. If a manager wishes to improve mule deer habitat, he can plan his system to benefit rabbitbrush.

continued

However, rest-rotation will work only if it provides for the needs of the vegetation. The plants must be grazed *only* when they are *ready.* When is a plant "ready"? One example is the date the plant matures—when the seeds ripen. If grazing waits until then, the animals will knock off and then trample the seeds, or in short, "plant" them. Another example allows the seedlings to become established before grazing is allowed.

How does this grazing system affect purported needs for artificial treatments such as brush control? Hormay believes managers should let their rest-rotation system work a few years before determining the need for brush control. Then—if the need is proved—treat only the acreage required. "In doing so," he reminds managers, "keep aesthetic and all other multiple-use values in mind."

Unfortunately, few Montana grazing managers have followed Hormay's criteria completely. Thus, most Montana grazing systems, at this point, do little for wildlife.

Possibly the most common deviation from Hormay's guidelines is brush control. Instead of allowing perfectly managed rest-rotation systems to alleviate the need for brush control, some managers have already controlled or apparently misinterpreted or misused the rest-rotation system to justify control. What do such deviations mean for wildlife? *Bad news.*

For example, the importance of wildland shrubs such as sagebrush to many big game and upland birds—especially antelope, mule deer, elk and sage grouse—is well documented. Wildland shrubs are also important in many other parts of the world, not just Montana.

In his article for the publication, "Wildland Shrubs—Their Ecology and Utilization," S.L. Everist wrote, "It is inevitable that wildland shrubs and trees should have greatest value to livestock in semiarid and moderately arid regions [of Australia] and have least value in humid regions . . . ."

H.N. Le Houérou came to the same conclusion concerning arid and nonarid Mediterranean and African countries. "All shrubs native to these regions are useful," he wrote in a technical report.

Can both wildlife and livestock prosper under proper management? F&G photo

"Many species are browsed and often constitute the only feed reserve during recurrent periods of drought; they thus enable survival of millions of animals that otherwise would perish . . . . Unfortunately, shrubs and trees are seriously mismanaged and are receding rapidly in the face of population pressures."

Since the intermountain region of the western United States is basically classed as semiarid, the findings of these two researchers strike home. But what do Montana land managers think about wildland shrubs like sagebrush? Instead of managing them, some managers seem to have a mania for ridding the landscape of them.

Or, in the words of Alberto Soriano, professor at the University of Buenos Aires, Argentina, "Man has progressed less in learning how to manage shrubs than he has in managing either herbs or trees." In Montana, mountain mahogany and antelope bitterbrush, for example, have been subjected to brush control simply because they were unfortunate enough to grow next to sagebrush.

Faced with objections to brush control, land managers have some interesting responses. One recently stated, "The [Montana Department of] Fish and Game says sage grouse and antelope need sagebrush. Well, there ought to be millions of both of them because we have a lot of sagebrush."

When referring to an area sprayed for sagebrush, another said, "The sage grouse population is down because . . . [hunting] seasons have been too liberal the past year or so."

Such statements reflect a negative, almost antagonistic, attitude toward the biological relationship that must exist naturally between wildlife, the land and the vegetation. *It does exist*—it's not instigated by biologists, land managers or anyone else.

When it comes to public lands, there's an especially important case in point. Sometimes there seems to be a misunderstanding about the intent of two public laws which state, in essence, National Forests and Bureau of Land Management lands shall be administered for livestock grazing, timber, watershed, *wildlife, fish* and *recreation* purposes and for preservation of public values under principles of multiple-use sustained yield production (emphasis added).

Obviously, the private landowner presents a different situation. He must extract a livelihood from his land. Nevertheless, most private landowners should realize (many do) that vegetation is the foundation of any livestock operation. A cow or sheep is simply energy derived from the plants, wrapped in a hide and sold at the marketplace.

So the benefits of rest-rotation grazing systems—for livestock, for wildlife, for man, for the land—are obvious, and right now, mostly avoided. Let's get with it.—*Joe Egan*

THE BICYCLE

CAN IT EVER BE THE FISHERMAN'S BEST BUDDY?

Story and photos by Harmon Henkin

IN GREAT BIG Montana—still basically a rural state—everyone from the Broadus rancher to the Butte businessman depends on the automobile as a magic carpet for work and play. The car practically defines our way of life.

Weekend hunting trips halfway across our formerly no-speed-limit-state in four-wheel drives, rows of shopping centers shooting out from our big cities, scores of drive-in restaurants serving instant meals to Kentucky fried travelers—all arranged for our driving convenience. We have made the car our emperor and almost all of our citizens pay it homage. We don't drive it anymore. It drives us. But, in what direction?

With the rising ecological consciousness undergoing a shotgun wedding to the so-called energy crisis, more and more people are asking that question and disliking the answer.

Into this crisis cast a mechanical bit player from history's stage. The bicycle amused us for a couple of decades between the curtain call of the horse as a significant means of transportation and the car's introduction as our chief character actor. Now, the bicycle is back in a stronger role than it had ever before. It may wind up playing a bigger role than even the fondest dollar-sign dreams of bike manufacturers from either the turn of the century or the late 1960s.

But if the bike is to make significant inroads, it is going to take a lot of will power and discipline—helped along by soaring gas prices—because we are total addicts. The auto is almost a reflex with us. When we think of freedom, we think of cars. And a switch from stepping on gas pedals to stepping on real pedals makes us shudder. It requires commitment for two wheels to become an understudy to our routine four.

In Montana, where distances have a sneaky way of getting out of hand, the conversion is especially hard. Nobody is foolish enough to think that the bike can totally remove the need for cars or trucks. Imagine taking a load of hay from Conrad to Browning on your bike! But it *is* undeniable that bicycles could handle many of the needless chores we manage to find for our faithful auto. Even in such traditionally car-based pursuits as fishing, camping and hiking, two wheels can find a firm niche.

However, the longest march starts with the first step and the longest bike trip starts with the first pedal. Before the self-propelled cycle replaces the automobile for excursions, the would-be cyclist must, in western parlance, "Ride 'em." The change in consciousness that accompanies bike riding comes slowly. The bicycle isn't a "toy" like most other recreational commodities with which we surround ourselves. If we let ourselves go, bicycling can become a way of life.

The bicycle sustains a lingering memory of childhood—one of the few toys we are allowed to retain from youth without being made to feel guilty. We usually remember cycling fondly because it is often

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intimately tied to our first sense of personal mobility, losing sight of our parents' house, beginning exploration of the world. It symbolizes a way of life that disappears when the driver's license becomes our passport.

It was nostalgia tempered by the adulthood skepticism that hit me one spring morning six years ago. A friend pointed at an orange relic of his younger days, leaning forlornly against his garage on two flat tires and inquired, "Wanna buy that old 10-speed?"

Hmmmmmm, an interesting possibility. I groped at the "protective" layer of fat that mysteriously accumulated around my waist during the long sedentary winter and wondered whether that frail, thin machine could support a fatty like myself. I was wary. In my kid days, a real bike had one speed, a bigger-the-better frame and when you wanted to stop to avoid the kid next door, you smashed on the pedal backwards. Now I was being salespitched that this bike had its brakes on the handlebars, more gears than a logging tuck, a frame that made you hunch over like a defensive lineman and a seat more fitting a chimp than a chump. It seemed awfully technical. I had become a fly fisherman because of the spinning reel's technological imperatives and here he was telling me I ought to become part of the *Mechanics Illustrated* syndrome.

I cast a sideways look at the ominous stream of cars zipping by on that residential street and positively shuddered at the thought of pedaling out in traffic.

"Only want 25 bucks for it and it cost around 75 new. Just needs a couple tires and you can pedal around town all day."

You hear the same sort of line whether you are buying a car, a snowmobile, a rifle or a canary, but a bargain is a bargain. Even if I didn't use it much and stayed on the sidewalk except for emergencies, I didn't have much to lose. After shelling out the money, I drove over to a store where I dimly recalled a "bikes repaired" sign in the window. The 10-speed business wasn't exactly booming then. The repairman gave me and the Orange the once-over, probably checking out our compatability and promised to have the bike fixed by the next day. I

The bicycle can carry the angler to many of Montana's prime fishing centers.

CHOOSING A TOURING BIKE

When choosing a touring bicycle, look for comfort and quality construction. Although some people travel on three- and five-speed machines, true enjoyment of touring can come only from riding a good quality, well-tuned ten-speed machine.

An ideal touring bicycle has:

- a lightweight seamless steel or steel alloy frame,
- downturned handlebars,
- quality fittings such as brakes, cranks and saddle and
- gears with 10 speed selections.

Let's take a closer look at a touring bicycle by disassembling it.

Frame—The frame is the most important part of the bike. A quality frame is a must, from the standpoint of comfort and safety. Tubing in a bicycle frame can be of mild steel, a steel alloy, aluminum, titanium, carbon fiber or even plastic. However, a quality touring frame is usually of Reynolds 531 double-butted tubing—thick walled at each end and thin walled in the middle. The use of 531 tubing makes the frame lightweight and gives it the strength to absorb road shocks. The frame should also be lugged—that is, the tubing "brazed" (soldered) rather than welded onto fittings. A wheel base of 41-42 inches provides good shock absorption and excellent control.

A properly sized frame is essential. A frame too small will cause cramped muscles after a short ride. A frame too large will cause excessive stretching of muscles, poor control and balance. Determination of a properly sized frame is a quick and simple matter. Wearing flat-heeled shoes, straddle the top tube of the frame. There should be enough clearance to lift the front wheel off the ground at least one inch.

Running gear, wheels, derailleurs, cranks and freewheels—Wheel rims and spokes often are made of special light-weight steel. But alloy rims and stainless steel double-butted spokes are best. Each wheel should have 36 spokes arranged on a low-flange, quick-release alloy hub. Quick release allows removal of the wheel from the frame by hand—a simple release of the locking lever means no tools are needed to remove a tire.

Tires are of two types, clincher or sew-up. Clincher tires are more common and they're easily removed from the reins. Tubes in today's high pressure tires hold up to 100 pounds of air. Sew-up tires are built by actually sewing a casing around a one-piece inner tube. Although sew-up tires are lightweight and hold up to 140 pounds of air, they're difficult to repair and should only be used by an experienced cyclist.

The derailleurs—or gear changers—should be metal, preferably a steel alloy. Both the Italians and Japanese manufacture high quality derailleurs. The rear derailleur should *not* be constructed for racing because the gear changes are limited. Make sure the derailleur handles a high range of sprockets on the rear free-wheel (a cluster of five, sometimes six, sprockets on the back wheel).

The freewheel and the front chain wheels enable the cyclist to climb hills easily and to speed along on the flats.

The crank set should be of light alloy and cotterless. Cotterless cranks are easier to maintain than all-steel cottered types found on most inexpensive bicycles.

Pedals should be of alloy and equipped with toe clips and straps.

Brakes—Brakes should be of alloy, center-pull type rather than side-pull. Center-pull brakes have a wire attached to the center and as the brake lever is squeezed, the brake arms and shoes close evenly. Side-pull brakes pull up from one side only. Some excellent side-pull brakes are available but they're quite expensive and unnecessary for most touring.

Handlebars and stem—Downturned handlebars of aluminum alloy with a correctly extended alloy stem are best. Find the proper stem extension by placing your elbow against the nose of the seat and extending your arm toward the handle-bars. The middle finger should just touch the handlebars.

Saddle—The sports saddle (or seat, if you prefer) is designed for efficient cycling. Although it seems hard and uncomfortable at first, it's designed to let the powerful buttocks and thigh muscles aid in cycling. The saddle should be of leather, dressed with neat's-foot oil.

If you pay careful attention to these guidelines, you'll be prepared for some enjoyable cycling.—*Frank Francis*

forgot about Orange for a week because there wasn't time to go on a bike ride. As long as my car functioned, the bike seemed like a plaything. However, I did remember it one day and took it home, almost like picking up a pair of shoes that you didn't know why you had resoled in the first place.

It was Saturday. And as befits the American experience, one of two days a week one plays with one's toys. I rolled it gingerly out onto the sidewalk. It seemed impossible to mount and still retain those adultish qualities of grace and dignity. Like the legendary dude in a bad western movie, I threw one leg over the seat and Orange promptly collapsed on me. "Whoa, there fella. Take it easy now." Too late to get my money back, I tried again. This time I made the seat, but before I could get the pedals going, I crashed.

Finally I succeeded, with all the trees and houses in the neighborhood intact. My only collision occurred when my childhood reflexes made me slam the pedal backward to avoid hitting a bush that jumped out at me. I spent most of the day pedaling around the area trying to conquer the intricacies of coordinating the gears and brakes. The gears were pretty difficult to master and I found a couple I liked so I stuck with those, a practice still adhered to these days, despite the ease with which I converse about Reynolds 531 frames, Campy Brakes, sew-up vs. clincher tires and other such biking jargon. My main injuries that first day were sore legs—and matching

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Watch for our next recreation guide on preserving, collecting and enjoying wildflowers.

After an invigorating ride, it's easy to relax on lakeside grass surrounded by Glacier National Park's scenic grandeur.

derrière caused by the bicycle's hard seat.

Cars were the most frightening part of the day. Although I hadn't given them a chance to get me, drivers in 1968 weren't attuned to the notion of sharing the road with anything but other gas eaters. In the dim days of yesteryear, loved ones became mortal enemies if they occupied an automobile driver's seat and you a bicycle seat. Of course there were the dirty looks from drivers who were indignant about having you on "their" roads. Maybe kids could ride bikes and trikes, but not adults—especially bearded ones with big briar pipes.

Nowadays bikes are commonplace. Cyclists have learned techniques of defensive, or maybe paranoid, driving and likely give dirty looks right back to the unenlightened who have yet to rid themselves of their automotve chains.

Gradually I began to use the bike for errands around town, even venturing to the wilds of downtown Missoula. But venturing beyond the city limits

EQUIPPING YOUR BICYCLE

How can you equip your new 10-speed touring machine to make cycling more pleasant? With hundreds of different accessories available, it's sometimes hard to separate the functional from the frivolous.

An alloy carrier fixed above the rear wheel serves several purposes. When you're touring, it holds books or small parcels. Or, it can support a pair of saddlebags or tote a sleeping bag. A small nylon pouch hung from the seat carries tools for crucial road repairs. Always carry some kind of safety flag to alert cars.

The bike should have a good handlebar bag and support. Canvas bags (the best) have a large roomy pouch with a double flap. The upper flap contains a clear plastic window—just right for a needed map.

Distributing weight evenly over the entire bicycle makes pedaling easier and provides greater control and better handling. Concentrating weight over the front wheel contributes to many accidents.

Always carry a tool kit. You never know when or where you'll next spot a bike shop. A basic kit should contain: 1 freewheel remover, 1 spoke wrench, 2 hub cone spanners, 1 chain tool, 2 long shift cables, 2 long brake cables, 1 can of light oil, 1 large crescent wrench, 1 small crescent wrench, 1 tire patch kit, 1 roll of handlebar tape, 3 tire irons for clincher tires or 1 tube of rim cement for sew-up tires, 1 set of metric wrenches, 1 screwdriver, 6 spokes and nipples (stored in the handlebars and easily removed by taking off the end plug), 2 new inner tubes for clincher tires or 2 spare sew-up tires, 1 tube of bicycle grease, 1 pair of pliers and 2 spare cotters (if you have a cottered crank).

Other necessary accessories include a water container and tire pump.

What about lights? If in an emergency you must ride at night, be sure you have a reflector on your rear carrier. Or fasten a flashlight to the handlebars with handlebar tape.

Now that your bike is equipped for touring, decide what personal gear you'll need, pack it up and enjoy the world as it should be enjoyed.—*Frank Francis*

Supper for the bike-riding angler.

still seemed insurmountable, as if I were a 15th century explorer fearful of falling off the edge of the flat earth. Nonetheless, the biking habit grew on me slowly, and the $25 investment seemed more worthwhile each day.

The real turning point came late that summer when tragedy befell me. My car's engine gave up the ghost and, in my soul, I knew it would be a great evening to fish. It was late in the afternoon before grief stricken mechanics with visions of dollars dancing in their heads towed the car away with solemn vows of great expense and long delays.

I tried to contact one of what had seemed a limitless list of hard core anglers who previously pawed enviously through my cache of dry flies. But they were all off on excursions to Montana's darker reaches, or busy with families.

Sitting nervously on the front porch, I watched the sun head mockingly for Idaho. Nobody knew the troubles I'd seen. I was tortured by thoughts of my broken car and visions of great brown trout hungry for a delicious muddler minnow properly presented in the Clark Fork.

"Eureka, the traveling Orange." There it sat in the garage like the third stringer moaning in the fourth quarter when the score is 13-6 (in favor of the bad guys), "Let me in the game, coach. I can do it. We'll win this one for ol' Troutfish High." Wow, could this benchwarmer replace my regular sleek starter?

Certain problems had to be surmounted before the bike could be mounted, "Heigh-ho, Orange, and away!" What about that 300-ton fishing vest I always lugged around like a security blanket and which always threatened to pull me under the murky depths? It might be possible to survive one evening's fishing with one rod, one reel and one box of flies. But sorting out the "gotta-have" flies from that mass of feathers and fur was like the father of a score choosing only one of his offspring for survival.

With my overwhelming anticipation of combat with Moby Dick's freshwater kin, I assembled a

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Bicycle camping. Will it continue in its present popularity?

presentable assortment and squashed them into one flybox. It was warm enough to substitute sneakers for waders. At that point, I also began to question my sanity for lugging around much of the paraphernalia I had hauled for years, giving me a gait reminiscent of Frankenstein in a Grade-B movie.

I didn't own a pack rod like the snazzy zillion dollar model I had custom-made by Izaak Walton's direct descendant last year, so an old three-piece, eight-foot bamboo model was disassembled into sections slightly less than three feet each.

Also, Orange didn't have a rack or the handlebar packs that make shopping or fishing much simpler. But, as they say, "Necessity is the mother of invention."

I was off.

In my days as a car addict, I always fished the Clark Fork as far from Missoula as I could get within one day. Any sensible fisherman knows that the further away you are from where you start, the better the fishing will be! But the river in town was always appealing, even from the vantage point of the car window. As I pedaled, I thought about where fishing might be best and settled on a spot about 1,000 yards downstream from the Orange Street Bridge, one of Missoula's busiest arteries.

It would be poetic to report that 10 casts provided me a limit of the largest trout snagged in Montana since the Eocene Age—but my poetry license has expired.

The truth is even better. I took a few fish, but more important, I got a relaxing look at a region I didn't know at all, my environmental backyard. As I cast that evening, a seemingly endless parade of metal wonders went past on the bridge above. What they were doing seemed to contrast with my pursuit of fish, more so than it appeared when I was one of the caravan.

A FEW FAVORITE BIKE TRIPS

Although it's impossible to list all popular bicycle tours in full detail, we did manage to gather a few of the most common. Bear in mind, though, that every area has some rewarding excursions for cyclists. Seek them out and then enjoy them over and over.—*Ed.*

MISSOULA AREA

The Missoula area offers several interesting one-day trips. The trip to Frenchtown—about 38 miles, 7 of which are gravel—takes the cyclist past Maclay's Bridge on the Southside Road and Harper's Bridge. Or, try a round-trip jaunt on the frontage road, through Milltown to Clinton and back again. Total distance is 32 miles, all paved. If you're in good shape, Lolo Hot Springs is 72 miles (round trip) all paved. Take U.S. 93 to Lolo, then U.S. 12 to the springs. The ride from Florence to Hamilton (Florence is about 20 miles from Missoula) is 52 miles round trip and the road is paved all the way; use Route 269 to Hamilton.

For a good two-day fishing trip, take Montana 200 to Milltown and Clinton, Route 209 to the Jocko turnoff and the Jocko road to Arlee. You'll see lots of river. Follow U.S. 93 back to Missoula. The trip is about 90 miles, 30 of which are gravel. Or, follow the one-day instructions for the trip to Lolo, then take the frontage road to Frenchtown and return to Missoula. That trip encompasses about 85-90 miles, with 25 miles of gravel.

If you're "up" to a three-day trip, the Swan Valley tour offers some of Montana's greatest scenic delights, including the Mission Mountains. The round trip is 231 miles, all paved.—*Dan Burden*

LEWISTOWN AREA

A trip to the Big Springs Trout Hatchery is a good ride for spring, summer or fall. The round trip is 14 miles from Lewistown, all on paved road. The scenery is pleasant and deer are often spotted. At the hatchery, cyclists can observe fish in various stages of growth and huge rainbow and albino trout in the aquarium. A picnic area with tables is available. The recently completed Hanson Creek Dam is a short distance from the hatchery.

Crystal Lake in the Snowy Mountains is a rather difficult 40 miles, round trip. The cyclist should probably have a 10-speed bicycle and 2 days. The scenery is beautiful and if this trip is taken in June, the lake is full. Picnic and camping facilities are available. Hiking trails to breathtaking observation points are plentiful in this area.—*John L. Ihde*

BILLINGS AREA

Several one-day trips around Billings combine cycling with other Montana attractions. The Old West Trail, 14 miles with one long hill, covers many historical points and museums. The back road to Laurel—on flat, paved surface—is about 35 miles round trip. Add a couple of miles and visit the Indian battlefield north of Laurel. Molt, northwest of Billings, offers an interesting old-time general store and post office. Sculpture in the Molt church is

With Orange sitting against a tree near the bank and a leisurely ride home after fishing, life seemed more in harmony than it ever had on my motorized angling trips.

This was before the energy crisis was continually speculated upon and just about the same time as the now pervasive word "ecology" became fashionable. I had a feeling that Orange and I were compatible fishing partners. Not meaning to sound pompous or self-rightous, cycling to a stretch of the Clark Fork to battle with trout seemed a harmonious thing to do. This is what the ecology movement tries to hammer home: that all parts of the world and everything we do *in* it are interrelated.

I have taken a good many fishing trips since on my bike and, admittedly, many in my car. I am more sophisticated about cycling. I can tell you that bicycling is the most efficient use of energy known to man, more so than walking. Many other facts learned from hanging around bike shops can be whipped off the top of my head now. Old Orange is at that Big Cycle Shop in the sky. Sleek Green came all the way from Paris with a $250 price tag.

I have taken some long trips, too, right out on the highway with cars and trucks zooming past. A friend and I took a two-week trip to Yellowstone Park that was one of the best fishing trips I've ever taken. Although our bikes were loaded with some 50 pounds of gear for the safari (which made pedaling much less enjoyable), I fished many of my favorite rivers such as the upper Clark Fork, Flint Creek, the Big Hole, Beaverhead and Madison with an entirely new perspective. That's more important than whatever minor technical expertise I have managed to assimilate.

Sightseeing without fossil fuel consumption.

I have gained a leisurely contemplativeness that spread to my fishing trips by car. I don't seem to be in the kind of angling hurry that I once was. A sense

continued

worth the trip—about 35 miles total with one long hill.

If a two-day trip sounds appealing, Pryor is about 45 miles one way. A campground and Chief Plenty Coups Museum and Memorial State Monument are among the attractions. If you're a fisherman, many miles of the Stillwater and Rosebud rivers are close to the road southwest of Absarokee. This part of Montana has good roads with just enough hills and curves for interest.

For three-day trips—or longer—the Absarokee-Stillwater River area would still be a good choice. Over 150 miles of safe, paved road and most of the dirt side roads provide good riding for 5- or 10-speed bicycles.—*A.R. Stone*

KALISPELL AREA

The Kalispell area offers two of Montana's most famous attractions, Flathead Lake and Glacier National Park.

Depending on your experience, the trip around Flathead Lake can take one day or two—or more. Take U.S. 93 out of Kalispell, passing through Somers and Lakeside. About five miles beyond Lakeside is the Lookout Museum, easily spotted because a large wooden ship is perched on the hill behind the museum. The scenery all the way into Polson is some of Montana's finest. Polson offers facilities for overnight camping; some camping areas are right beside the lake. Take Montana 35 around the east shore. This part of the trip is delightful no matter what the season—cherry blossoms in the spring; ripe, juicy cherries in the summer and crisp apples in the fall. Blue, Yellow and Woods bays offer some good swimming if it's a hot summer day. After passing Bigfork, either take the Bigfork cutoff and meet up with U.S. 93 and continue into Kalispell, or follow Montana 35 through Creston and into Kalispell. Round trip distance is about 100 miles.

From Kalispell to West Glacier, through the park over Logan Pass and back, through St. Mary's, Browning and East Glacier—that's a rough 200-mile trip, but one that challenges even the most experienced cyclist. Abundant wildlife, Glacier's breathtaking views, camping and hiking are among the side benefits. In summer, traffic is heavy and cyclists are wise to attach a flag to their bicycles. Also, if you plan to camp, arrive early because campgrounds fill rapidly.—*Mark Calbick*

HELENA AREA

The round trip from Helena to Clancy offers rolling country that helps the cyclist get in shape for more demanding rides. Take Interstate 15 to the Montana City turnoff and then follow the old road into Clancy. The 20-mile round trip is all paved.

Canyon Ferry Reservoir is a more demanding one-day trip. It challenges the cyclist with some fairly long hills. Take U.S. 12/287 (via East Helena) and follow it until you see the Canyon Ferry cutoff. Follow the Canyon Ferry road until you see the reservoir—you may want to continue on around. (However, the road around the reservoir is mostly unpaved.) Distance from Helena to Canyon Ferry is about 20 miles.

Or, take North Montana Avenue (which turns into Green Meadow Road) to the old Lincoln Highway. Then follow the road north to Canyon Creek and back. You may also take a left turn and follow the old highway into Marysville.—*Alan Taylor, Tim Jones*

BICYCLE TOURING-TRIAL AND ERROR

Two ways to ruin a cross-country bicycling trip are—(1) pack too lightly for a long trip or (2) pack too heavily for a short trip.

Use equipment suited to the distance and rigor of the trip and you'll have a successful tour.

If a cyclist doesn't have a precise itinerary, any pack filled with the basic necessities of a long trip—with a minimum of space-consuming luxuries—will do. A change of clothes, warm jacket or sweater, enough food for at least a day, sleeping bag and tent or tarp are necessities. Assume that, before the trip is over, your feet and possibly your clothes will get wet at least once, especially if you intend to catch your dinner in one of Montana's cold lakes or streams. (One of my first excursions ended three-fourths of the way to the top of Logan Pass in Glacier National Park. I was exhausted, one of my tires was flat and I was stranded without plan, pack or pump. The ranger who gave me a ride down—in his truck, of course—could have criticized my lack of forethought. But he probably understood that my misery would make me think ahead next time.)

Before considering a bicycle trip that will take you further than the end of the block, buy a bicycle rack. It's impossible to use a standard backpack on a cross-country trip because abdominal muscles provide a weak fulcrum. An aluminum rack and set of saddlebags prevents trip-long backaches.

Attach the saddlebags above the rear wheel of the bike. You needn't purchase expensive nylon models; canvas bags work fine, even if you're not especially gifted with needle and thread. To carry luxury items such as cameras, a handlebar bag is best because it's easy to reach.

A goatskin bag for water might be the heaviest single item you'll carry. It's important to retain water in blistering heat, especially if you're in high country. A supply of heavily salted pumpkin seeds helps and doesn't occupy much space. Anyone who has done any backpacking knows what is necessary for a lightweight camp. The real difference between backpacking and bicycle packing is that you must have less weight, less bulk and a tightly bound pack. To attach loose items, cloth straps with buckles are unbeatable. (I remember one summer trip when I kept picking up stray shoes or fishing poles that rattled from the bike ahead of me.)

Nuts are a healthy supplement to meals of dried vegetables. Dried fruit boiled in water makes a delicious dessert pudding. Cyclists can usually pick up meat and other fresh groceries in small towns along the way. (I usually manage to find enough room to squish a pound of hamburger between an extra pair of socks and a sweater.) A few hunks of chocolate provide that extra boost when energy runs low.

An unpleasant experience taught me the value of a bicycle light and a map. I was riding one day in the Big Hole country when an intense craving for meat and potatoes hit me. It was obvious that a quick trip to Wise River was in order. Unfamiliar with the area, I guessed the direction of town and rode on in. It was dark before I arrived. The camp and my partner were 15 miles upstream, so I literally had to feel my way back along the highway after a guilty dinner.

One rule should be remembered: Pack only bare necessities because the most important consideration is a light pack. You'll learn through experience that it saves injury to your bike and perhaps to yourself.—*Mark Meloy*

of peace now accompanies my outings.

I remember vividly the limousine encased man who assured us that the highway between Divide and Melrose was "pretty flat." Some positively agonizing hills had to be conquered before reaching Melrose. As we stood gasping on one of those highway Everests, I really understood how the view of a cylist differed from that of an automobile driver—as if we were traveling on two different roads.

On that same trip to Yellowstone, we pitched camp along the Big Hole after a hard day's ride. The stretch of river along the campground didn't look that great from the road, but the next campground was 15 miles downstream and that seemed like a considerable distance. After resting a bit, we walked along the very low river. Since we were more or less marooned on that stretch for the evening, we looked carefully and turned up an amazingly great hole that produced literally dozens of rainbow, browns, whitefish and grayling. Unless an angler looked very carefully, the hole didn't look like anything special. None of the hundreds of cars roaring past even slowed down for a second glance. None slowed down, that is, until the drivers started noticing those blunt-speaking arcs in our rods.

Our discovery came from a change in perspective. Slowing down provides new insight into your whole environment.

Neither are the days of long jaunts over for me (gas prices and availability willing) nor is my car rotting from boredom. I just know better now. Whenever I drive past a huffing, puffing cyclist, I know that ultimately the biker is more right than I. Would this country be a better place to live if the car and the wasteful problems it creates banished—except for special occasions?

Impatience is an All-American vice and I fall from biking grace all too often. But my cycle is a permanent part of my outdoors future. As I write this, temperatures dance near 10 below and Sleek Green hibernates in the garage. I think about the wonderful Clark Fork and the fishy monsters that call it home. I think about biking to their dens.

Cycling isn't a panacea for the energy crisis, the environmental crisis or even a personal crisis. However, not even Detroit claims that driving a car is good for your health, that bicycles use more of our rapidly dwindling stock of fossil fuels than autos or that a mighty network of bikeways destroys more of our environment than four-lane freeways.

Perhaps in this day of technologically inspired verbal overkill, it is enough to say that biking is fun and a good thing.

Smokey Bear . . . revisited

Your editorial in the Nov./Dec. 1973 *Montana Outdoors* presents a rational view of the place of natural fires in Montana's wildlands. As director of the Smokey Bear campaign, I was glad to see it.

If Smokey is not always a hero, as your title says, neither is he the villain that some writers paint him. Smokey's target is "forest fires," which by standard definition, are "wildland fires not prescribed for the area by an authorized plan." I know of no fire ecologist who wants to turn his back on unplanned, unwanted wildland fires.

I have taken most of our big game species—moose, bear, sheep, caribou, deer, goat and elk—and am very interested in their welfare. I am also an advocate of professional use of fire as a management tool. At the same time, I think we need to recognize that other alternatives to fire frequently exist. Pennsylvania's deer herd is a good example of a big game resource that is thriving under close protection from wildfires.

The real challenge is to incorporate fire into land management plans. If plans are competent and presented to the people with candor and judgment, the people will support them. *Planned fires, whether natural or man-made, are not forest fires!* Let game managers make that point, and the apparent conflict with the "Smokey Bear" message will disappear like mist in the morning sun.

Mal Hardy, Assistant Director
Cooperative Forest Fire Control
U.S. Forest Service
Washington, D.C.

Bill Schneider's editorial, "Smokey Bear is Not Everyone's Hero" (Nov./Dec. 1973 MO), dealt in a positive way with the beneficial aspects of fire in the forest and on the range. Sometimes I feel as he does—that we are going in the right direction but too slowly. On the other hand, my staff and I are convinced that we have to begin using the beneficial aspects of wildfire on the basis of well thought out prescriptions that reflect a sound understanding of the ecological processes that work on the land and relate these to the management objectives sought in the local areas.

We have begun prescribing natural fires in the wilderness because (1) the land management objectives are indelibly clear and (2) the tolerance for error in allowing fires to burn to prescription is greater. Wilderness is a good place to practice and develop our methods. We intend, however, to expand these philosophies and procedures far beyond the wilderness so that the American people can reap the benefits of fire as an agent of diversity in all management units.

To get started outside the wilderness, the chief has approved a fire management research, development and application program to be chartered on the Bitterroot and Nez Perce national forests. Five years of intensive effort will be directed at bringing to bear all present research knowledge in an effort to adjust our fire programs and activities so they benefit the management objectives sought for each unit. As the land management objectives differ, so the fire management activities will similarly differ. This exciting—and environmentally oriented direction—will certainly challenge our land managers and fire specialists.

William R. (Bud) Moore, Chief
Division of Fire Management
Northern Region, U.S. Forest Service
Missoula, Mont.

I enjoyed your editorial, "Smokey Bear is not Everyone's Hero," in the Nov./Dec. 1973 issue of *Montana Outdoors*. That kind of treatment of the fire issue contributes to an increasing appreciation of the role of fire in the ecosystems of our area.

Our society has been conditioned to believe fire is either a negative force or a tool of forest management. Actually, fire is (and has been through evolutionary time) one of the components of the environment. Plants, animals and entire ecosystems have evolved characteristics that make them successful in such environments. Some species of plants and animals have evolved dependencies on fire occurring at natural intervals. Therefore, we see that fire in itself is neither good nor bad—it has morality only in the context of man's value system.

As more is known about fire and its many functions in ecosystems, it becomes apparent that fire must be accommodated in the management of wildlands. Depending on the values being featured in management of an area, options exist for using fire when and where it occurs naturally or prescribed fire when and where it is needed.

In 1970, the White Cap Wilderness Fire Management Program you referred to was begun in the Selway-Bitterroot Wilderness. The objective of the study was to develop the inventory and planning procedures necessary to implement the new Region One Forest Service policy that ". . . in wilderness, fire will be allowed to play a more natural role." The study has been completed and the guidelines described. The guidelines were used in the 100-square mile "White Cap Study Area" to prepare a Wilderness Fire Management Plan. The plan was approved by the chief of the Forest Service in Washington, D.C. in August 1972, thus becoming the first operational fire management plan in the Forest Service. One fire occurred in the fire management area during 1972 and six during the 1973 fire season.

The objective of wilderness fire management is to manage fires in harmony with the Wilderness Act. The Wilderness Act requires that wilderness be managed to perpetuate natural and unmodified ecosystems. This requires that the full complement of natural forces and resulting processes be allowed to operate. Fire is one of the most important forces in the environment. In wilderness it should be allowed to be expressed naturally (with constraints) to protect life and property and resources outside of wilderness. This management approach does not maximize wildlife forage but it does provide for natural relationships over time between the environment, wildlife habitat and animals.

Because I have a strong interest in wilderness and have been involved in the Wilderness Fire Management Program, I am anxious to see broad implementation of fire management in wilderness. Realistically, tight financing and other priorities make it easy for land managers to program monies for other management programs. The public, in general, appears to be satisfied with the fire exclusion approach in land management. Until a larger and more vocal segment of the public becomes aware of the ramifications and expresses its concerns to land managers and politicians, the Wilderness Fire Management Program will probably expand quite slowly.

Education is the key. Good articles and editorials are needed. Broad coverage of ongoing fire management programs must be obtained.

David F. Aldrich
Wilderness Fire Planner
Bitterroot National Forest
Hamilton, Mont.

APPROACH APPRECIATED

I cannot speak too highly about the Nov./Dec. 1973 issue of the magazine. It

continued

was a careful and most satisfying blend of sane ecological knowledge, mercifully free of the "Me-and-Joe" material which is far too prevalent.

Although the magazine is published by a Fish and Game Department, it shunned the hunting-at-all-costs approach which, in my opinion, downgrades so many of the state publications. Although hunting has its place, of course, an animal has far more relevance and importance than to believe it is with us solely because we favor it in the chase.

There was a nice feeling in this edition and I think it ranks today among the best of its type being published in North America.

Keep it up! And thank you for it.

Bill Ward, Editor
Wildlife Review
Department of Recreation
and Conservation
Victoria, British Columbia

ON SUBDIVISIONS

Congratulations on the article, "The Subdividers are Coming!" in the Jan./Feb. 1974 *Montana Outdoors*. The cover aptly illustrates some of the scenery that residents and visitors see along our highways and in our newspapers. The article was well-written and I am looking forward to the follow-up piece.

One point made in the article was the sad fact that present laws do not permit reservation "by zoning" of areas of land for wildlife use. As a member of a local planning board, I cannot understand why land zoned for agriculture cannot be used for wildlife. Wildlife production is almost as important economically as the usual pursuits of agriculture, i.e., timber production, wheat ranching, cattle production or what have you. It does point out that we probably need a better definition of agriculture in Montana.

The main benefit of areawide planning is to create a comprehensive plan for a total land area. This plan in turn allows land use zoning to be created for the land area involved. Land use zoning would be the setting aside of specific areas of land for specific purposes such as timber growing, cattle production, crop raising, recreation and other multiple-use zones. As we all know, wildlife is one of the most important parts of the total recreation picture in Montana.

I hope that you can point out in your next article what has been done by various boards to minimize the impact of indiscriminate subdividing in this state, as well as indicating the type of legislation needed to create better land use management.

John Waldron
Helena, Mont.

PRESERVING MONTANA'S PRIDE

As a student of wildlife ecology and natural history and a resident of Montana, I have been extremely concerned about the confrontation of Montana lands by coal strip mining operations. I wish to congratulate *Montana Outdoors* for its recent coverage of the "coal crisis" in Montana. This, I believe, was instrumental in the triumph of Senate Bill 94, the Montana Strip Mining and Reclamation Act.

The act provides Montana with one of the strictest—if not *the* strictest—mining and reclamation laws in the United States. The act will serve the best interests of Montanans and Americans by providing for a strict land use and reclamation ethic in Montana, thereby providing for preservation and management of our natural resources upon which our livelihoods and lives depend. These vital natural resources include topsoil, water, aesthetic qualities and other components. Natural vegetation, wildlife, cultivated crops and cattle are dependent upon our natural resources. The well-being of these biotic resources, as determined by the wise use and management of our natural resources, will directly affect our personal economic and healthful well-being.

The act does not ban strip mining. It allows strip mining for economic profit and provision of fuel for electricity generation and coal gasification, and at the same time guarantees a 100 per cent planned reclamation of prospecting and mining sites. The opportunity provided for economic growth and development called for by energy companies, jobless miners and other mining interests and environmental conservation aspects of the act show how sufficient energy and environmental standards can coexist.

Joseph Kuzara and the pro-strip mining Resource Information Association (RIA) lobby have indirectly accused environmentalists of placing wildlife species before merchants and miners on the endangered species list. This implication was formulated to scare merchants and miners into supporting pro-mining lobby efforts. No evidence suggests that miners and merchants should be placed on any type of "endangered species" list, as have certain wildlife species. Wildlife is relatively restricted in its range and can be vitally intolerant to sometimes even subtle changes in its habitat.

People, on the other hand, are readily mobile, being restricted only to the earth's surface. The human population has been able to adapt to harsh environmental conditions and changes. For example, irrigation, fertilization and pest controls (either chemical or biological) have allowed us to agriculturally adapt to lands that would otherwise support no crop. Wildlife itself cannot set up irrigation and revegetation of poorly reclaimed strip mined land. The laws of the people must do it for them, and the Montana Strip Mining and Reclamation Act will. Otherwise, the wildlife populations would disappear or face a serious setback in quality.

Merchants and miners who are alarmed about the RIA's assumption that the act will abolish their jobs should realize that it is not the act itself which might reduce the number of jobs available but rather the energy companies which are unable—or in most cases unwilling—to contribute a portion of their profits to proper reclamation and therefore choose not to mine in Montana. The January 1973 Situation Report of the Montana Coal Task Force, entitled "Coal Development in Eastern Montana," states: "For Montana coal mines, reclamation costs are only a few cents per ton. The United Mine Workers' Pension Plan takes 20 to 40 cents per ton on certain mine sites and railroad freight rates to midwestern power plants reportedly range between six and eight dollars per ton. Therefore, reclamation costs are not prohibitive.

"Jobs and population increases from coal development will depend on the number and kinds of enterprises that are established, as well as the scale and efficiency of operations. There is considerable variation between employment estimates . . . but it is notable that the lowest figures come from companies actually planning for power and gasification plants."

When energy companies are willing to pay for proper reclamation under the act, mining operations will commence, and the corresponding jobs and economic development will ensue.

Montana is a remnant of the Western frontier. It has value as an agricultural, recreational and natural resource state.

Next Time

Watch for these features in the May/June 1974 issue of *Montana Outdoors*

—a state water plant?
—more on subdivisions
—aquatic invertebrates
—state fishing records
—shocking fish
—growing your own worms
—enjoying wildflowers (MO recreation guide)

The Montana Strip Mining and Reclamation Act is able to maintain a healthy balance between these three treasures. Its provisions are ecologically sound and fair to the profits of energy companies.

It is preservation of pride in our unique and beautiful state that will prevent abuses from scarring the magnificent natural habitats for which Montana is famous. The act deserves the continued support of every Montanan, regardless of the possibly overwhelming anti-strip mining legislative propaganda and lobbying.

DeAna Nasseth
Texas A&M University
College Station, Tex.

FISH AND GAME FILMS

We get *Montana Outdoors* at the school where I teach and I read it there.

I teach biology and I am interested in the antelope film. Are these films available out of Montana? Are other such films available for schools? I'll be waiting to hear.

Mrs. John Pangratz
Caledonia, Minn.

•*The films are not usually sent out of state. However, they are available, free, to schools, sportsmen's groups, public service groups, etc. within Montana.*—Ed.

ILL-ADVISED DRAINAGE PROJECTS

The Sept./Oct. 1973 *Montana Outdoors* article, "Managing Ducks and Geese for Fun and Profit," by Frank Gjersing was a good one as far as pointing out the atrocities of ill-advised drainage projects committed by the Soil Conservation Service against ducks and sound land management, with my tax money footing much of the bill.

I would question the value of rest-rotation grazing in regard to duck habitat. It is a shallow token gesture. The cover is, of course, not there in the spring of the rest period. If sufficient rainfall occurs, there will be cover the following spring. There will also be the tramp, tramp, crunch, crunch of clumsy cloven hooves. How many degrees in wildlife study are needed to figure that out? The heavily nested areas nearest the reservoirs are the same ones most heavily used by stock for grazing and loitering. The two don't mix well.

Fencing the reservoir edges to provide small areas for natural woody plant and grass growth was dismissed in this article with a five-line paragraph stating the cost seems to outweigh the benefit. Bunk! I recently encouraged a Ph.D wildlife authority to promote fencing off—from the grinding hooves—small tracts of reservoir edge for wildlife cover. His, to me, unbelievable reply was that the idea was no good as the predators would eat them.

I say show me any pond, except where extreme alkalinity is involved, that does not quickly develop useful bird nesting habitat when grazing is prevented by fencing or other means.

The government, if I'm not mistaken, has shared in cost of fencing in various agricultural situations and damn well could for the benefit of wildlife along these endless, ugly, mudhole reservoirs. The damned cows just don't need to be allowed to ruin the whole reservoir for all other purposes to just get a drink! Fencing out a small part of the shoreline and adjacent land for wildlife is just practical common sense. If the "authorities" will not re-evaluate their position on this, then I ask anyone controlling any reservoir or slough to fence the cattle out of a part of it and then enjoy the ensuing benefits to wildlife and themselves. As the waters clear, mud banks revegetate and woody plants appear, you will witness a most gratifying thing.

Clayton V. Berg
Valley Nursery
Helena, Mont.

MO DOUBLES AS TEXTBOOK

We'd like to thank you very much for *Montana Outdoors*. The Sept./Oct. 1973 issue has proved very valuable in our class, particularly the articles on the early bull season and mule deer. As a result of the exposure to our students, about 20 new subscriptions were ordered by individuals in the school. We feel that the magazine is becoming one of our most valuable teaching tools; the students respond to it better than any textbook!

We were reading the Nov./Dec. 1973 issue which criticized the lack of planning by the U.S. Forest Service and felt it was an excellent issue.

It is our goal to make *Montana Outdoors* the basic text for our classroom. And it is through your magazines and materials that our class has expanded as it has.

Gary Burt and
Harry Mular
Flathead High School
Kalispell, Mont.

WE WILL REMEMBER HIM

Gene Sara

Eugene Sara, Department of Fish and Game warden in Thompson Falls, died Jan. 7 of wounds sustained in a shooting incident while on duty.

Gene was born Oct. 17, 1925 in Butte. He was raised in Marysville and Great Falls and was graduated from Great Falls High School. He attended St. Ambrose College in Davenport, Iowa.

He was a veteran of World War II and the Korean conflict.

Survivors include the widow, Lois, Thompson Falls; two sons, Edward and Robert, Billings, and a daughter, Mrs. William Lape (Wanda) of Santa Ana, Calif. He is also survived by one sister, Mrs. Evelyn Engstrom, and his mother, Mrs. Marie Sara, both of Helena. He was preceded in death by his father.

Gene joined the department in 1965 and served as warden in Billings until November 1973 when he was transferred to Thompson Falls. Orville Lewis, enforcement division administrator said, "The department will deeply miss Gene's contributions. He was completely dedicated to the wildlife resource and well respected by both the recreational public and his co-workers. His outstanding contribution was his service to landowner/sportsman relations."

Funeral services were conducted in Helena.

book reviews

GIFTS OF AN EAGLE by Kent Durden, illustrated by Peter Parnall; Simon and Schuster, New York; 1972, 160 pages, $5.95.

Author Kent Durden presents to the reader a sensitive, true story of Lady, a golden eagle who shared 16 years with the Durden family until the stirring moment when she flew back to freedom with a wild mate.

From the first chapter in which the author acquires the nestling eaglet to the conclusion in which he describes Lady's departure, the reader is presented with one of the most heartwarming and intimate portrayals of a man/animal relationship ever documented.

One of the difficulties in writing a book of this sort is the peculiar unevenness which usually occurs. Such books usually run the gamut from ecstatic, subjective and undependable pieces about "our little feathered friends," to erudite, accurate—but sometimes stuffy—treatises on such things as the chemical analysis of nucleoproteins. Such is not the case with "Gifts of an Eagle." Whether the reader's interest is that of an astute bird watcher, a member of a sophisticated bird club or a trained ornithologist, he will not only enjoy but also will profit from reading this book.

Durden's documentation of Lady and imprinting (young animals becoming attached to the first large, moving object they see after hatching) are well done. The author describes in great detail the humorous events that occur between Lady and her "offspring," ranging from goslings to owlets. Imagine a mature eagle, for example, trying to feed a chunk of horsemeat to a precocial gosling.

Durden concludes his book with a few paragraphs on how this majestic bird is fighting for its very existence. For over two decades, the number of golden eagles has steadily declined as advancing civilization, illegal shootings, predator poisons and other unknown effects of modern technology have taken their toll.

Don't miss Kent Durden's "Gifts of an Eagle" if you are interested in reading a well-documented story of a captive eagle and the many trials and tribulations she faces during her lengthy stay with the Durdens.

One also gains the satisfaction of knowing that the only world worth living in is one with a wholesome society meshing harmoniously with nature—a world in which all values relating to nature are recognized and nothing is sacrificed needlessly.—*Ken Walcheck*

Albert Earl Gilbert

Interested in Wildlife Art?

The National Wildlife Art Exchange, Inc. publishes an international wildlife print series, one of which is pictured above. "The Bald Eagle," reproduced in a single color here, is actually a beautiful full-color print of an original painting by Albert Earl Gilbert. The print measures 18 x 23 inches.

Information on this and other guaranteed limited edition prints is available from: National Wildlife Art Exchange, Inc., Drawer 3385; Vero Beach, FL 32980.

We thank this organization for permission to reproduce some of these prints. In the future, we'll feature some in full color.

(Incidentally, it is illegal to hunt, kill, capture, possess, purchase, offer or expose for sale, transport or cause to be transported any raptor [bird of prey] in the state of Montana. Before anyone can possess a golden eagle, he must have a special permit from the federal Bureau of Sport Fisheries and Wildlife.—*Ed.*)

BOOKS RECEIVED —reviewed in brief—

COMPLETE OUTDOORS ENCYCLOPEDIA by Vin T. Sparano, Harper & Row, New York, Evanston, San Francisco and London; 1972, 622 pages, $13.95.

If you need a one-volume reference to answer questions about the outdoors, this book will probably serve the purpose. It contains 10 sections: hunting and shooting, game animals and birds, fishing, game fish, camping, boating, archery, hunting dogs, first aid and outdoor information guide. The text is enhanced by some 1,300 illustrations, including "how to" drawings, photographs, comparative size charts and other factual drawings. The one drawback is the book's size—it's too large for easy field use.

THE COMPLETE BOOK OF BICYCLING by Eugene A. Sloane, Trident Press, New York; 1970, 342 pages, $9.95.

The appeal of this book is that it is indeed *complete*. It tells beginners what to look for in a bicycle. It offers detailed charts enabling the more experienced cyclist to do his own repairs and maintenance. It contains chapters on safety, learning to shift gears, touring and camping, care of tires and history of bicycling. It includes lists of bicycle organizations and stores, a dictionary of terms and a complete index.

ON ICE AND SNOW AND ROCK by Gaston Rébuffat, Oxford University Press, New York; 1971, 187 pages, $15.

It's expensive, but it's filled with some of the most incredible photographs of mountaineering—58 in color and about 200 in black and white. The text is aimed at the beginning climber or one who wishes to improve his skills. Rébuffat, who is a foremost authority on mountain climbing, writes with clarity as well as sensitivity. So it's a book not only to refine one's skill but to enlarge one's philosophies. As he says, "To climb smoothly, between sky and earth, in a succession of precise, efficient movements, induces an inner peace and even a mood of gaiety; it is like a well-regulated ballet, with every man on the rope in his right place."

DID YOU EVER SEE A FAT SQUIRREL? by Ruth Adams, Rodale Press, Inc.; Emmaus, Penn., 1972, 268 pages, $6.95.

The author believes Americans eat the way we do—food that makes us fat—because many large and powerful

companies make tidy profits by convincing us that these foods are not only tasty, but attractive, delicious, status-giving—and highly nutritious. We eat too much for the same reason we smoke too much and buy too many cars. Madison Avenue spends billions of dollars yearly convincing us we should. Ruth Adams urges a return to foods free from preservatives, fresheners, emulsifiers and refinements. By eating the kinds of food our ancestors ate, she believes we can free ourselves from our "preposterous national burden of overweight."

GUIDE TO FAMILY CAMPING by George S. Wells, Stackpole Books; Harrisburg, Penn., 1973, 188 pages, $2.95, paper.

This is a handy, helpful guide for families who like to camp. Campsites are discussed with degree of "roughing it" in mind. Hints are provided for choosing a shelter, equipping a camp kitchen and selecting other necessary equipment such as sleeping bags, air mattresses, heaters, etc. An entire chapter covers organizations and clubs from which family campers can request information about specific areas. The emphasis is on vehicular family camping.

contributors

Allen Schallenberger, author of the cover article on bighorn sheep, is a game management biologist for the department, based in Choteau. He received a BS in wildlife technology from South Dakota State College, Brookings, and a MS in fish and wildlife management from Montana State University, Bozeman. He is co-chairman of the Northern Wild Sheep Council, an organization engaged in research and management studies of wild sheep.

George D. Holton, assistant administrator of the department's fisheries division, received a BS from the University of Wisconsin, Madison, in zoology and a MS in fish and wildlife management from MSC. He is a past member of the American Fisheries Society Endangered Species Committee and has conducted fisheries research projects in Wyoming and West Virginia. His article asks if Montana should have a state fish. Mr. Holton thinks so and nominates three "candidates."

Joe Egan defines a grazing system for wildlife in his editorial. Mr. Egan, the assistant administrator of the game management division, received BS and MS degrees in fish and wildlife from MSC. He has also worked as a management biologist for the department in Miles City and district game manager in Miles City and Bozeman.

Harmon Henkin, in our second "recreation guide," describes his fear of facing a bicycle again after many years' absence. Mr. Henkin has written for several national magazines, including *Outdoor Life*, *Nation* and *Sports Illustrated*. His first book, "The Environment, the Establishment and the Law," was published in 1970 and he now is working on a book on backcountry angling for Prentice-Hall. MO thanks Mark Meloy, a graduate student in political science at the University of Montana, and Frank Francis, a bicycle mechanic at Montana Sports in Missoula, for their contributions to Henkin's article. And for trip information, we thank Dan Burden, Missoula; Mark Calbick, Kalispell; Alan Taylor and Tim Jones, Helena; John L. Ihde, Lewistown and A.R. Stone, Billings.

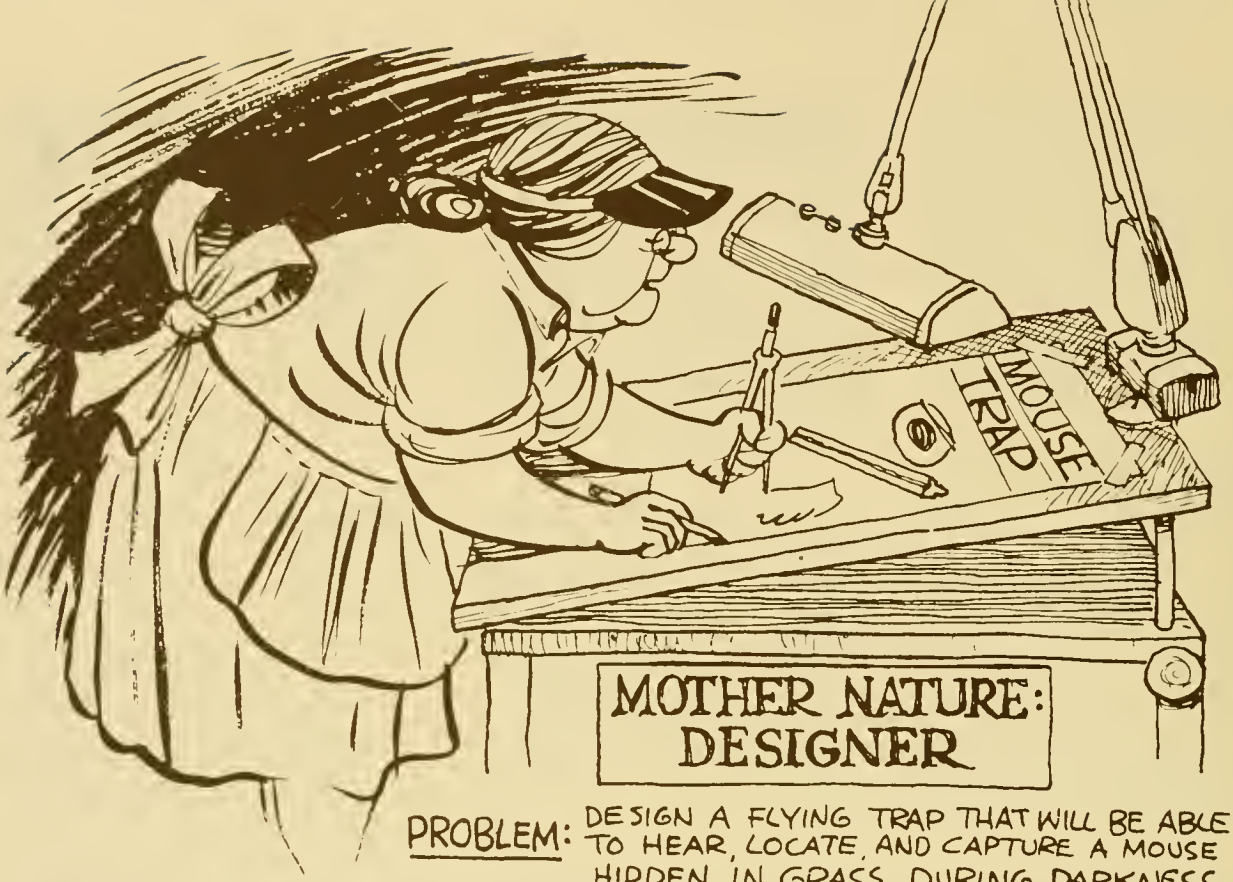
LAST CALL FOR EARTH DAY CONTEST

Although the President hasn't made his official proclamation at this writing, Earth Day is fast approaching. So, if you haven't started your project, it's time to get going.

After announcing the contest in the Jan./Feb. 1974 issue, one reader wondered if only schools and school classes were eligible. Although this was our original objective in sponsoring the contest, we've decided to open it to other youth groups such as Boy Scouts, Girl Scouts, church groups, etc.

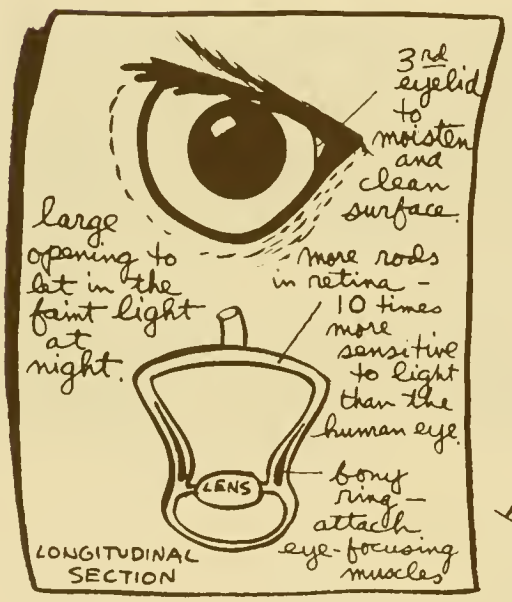
Each member of the winning group (or individual) will receive a free one-year subscription to *Montana Outdoors* and a special letter of congratulations from Wes Woodgerd, director of the Department of Fish and Game. In addition, an explanation of the winning project and perhaps some of the actual work will appear in the magazine.

Deadline for submission of all entries is June 15, 1974. Good luck.—*MO Staff*

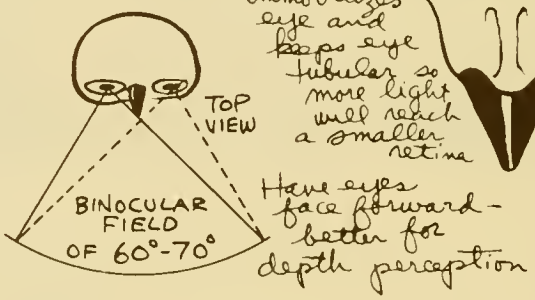


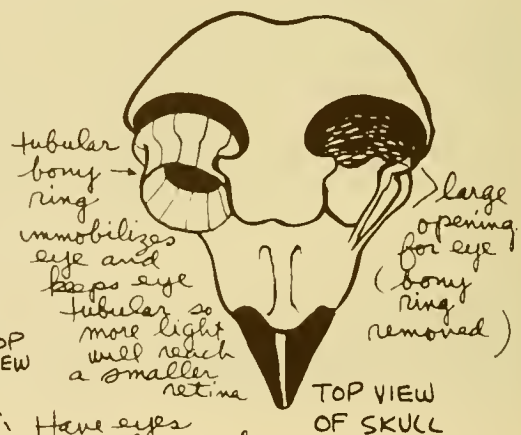
MOTHER NATURE: DESIGNER

PROBLEM: DESIGN A FLYING TRAP THAT WILL BE ABLE TO HEAR, LOCATE, AND CAPTURE A MOUSE HIDDEN IN GRASS DURING DARKNESS.


3rd eyelid to moisten and clean surface.
large opening to let in the faint light at night.
more rods in retina - 10 times more sensitive to light than the human eye.
LENS
bony ring - attach eye-focusing muscles
LONGITUDINAL SECTION

SIGHTING DEVICE

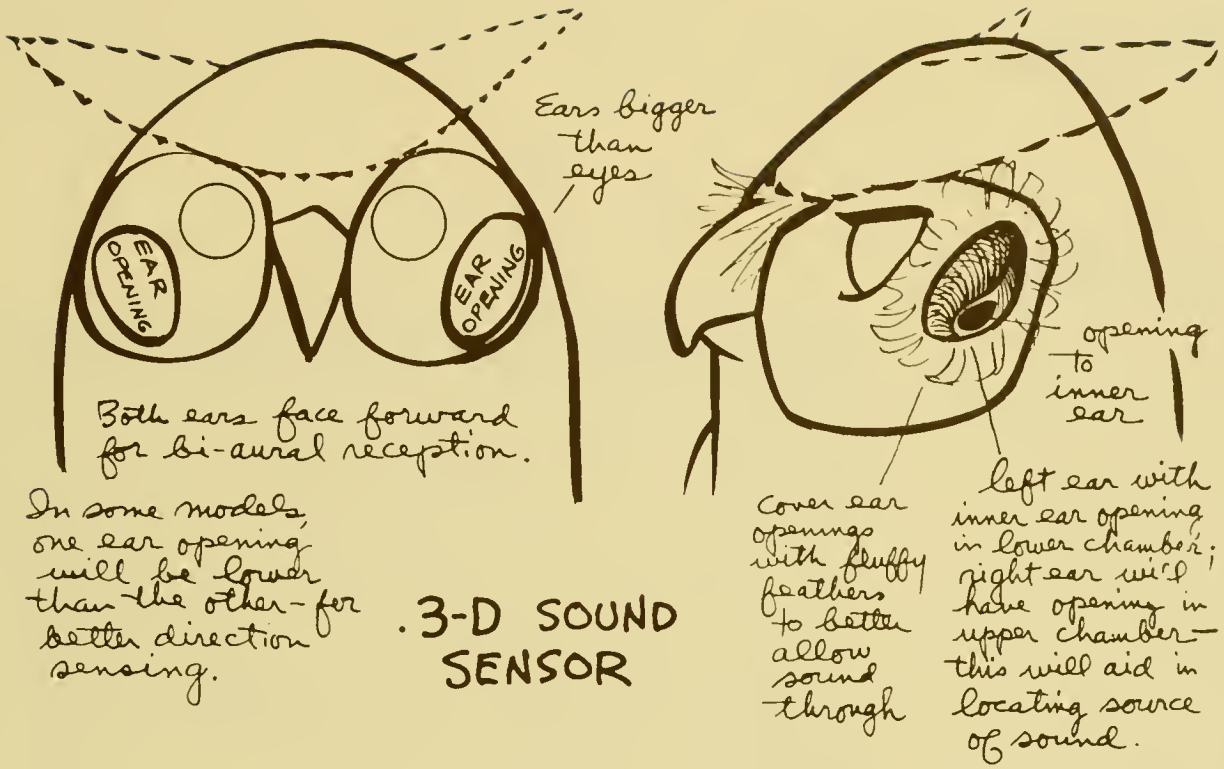



tubular bony ring immobilizes eye and keeps eye tubular so more light will reach a smaller retina
large opening for eye (bony ring removed)
TOP VIEW OF SKULL

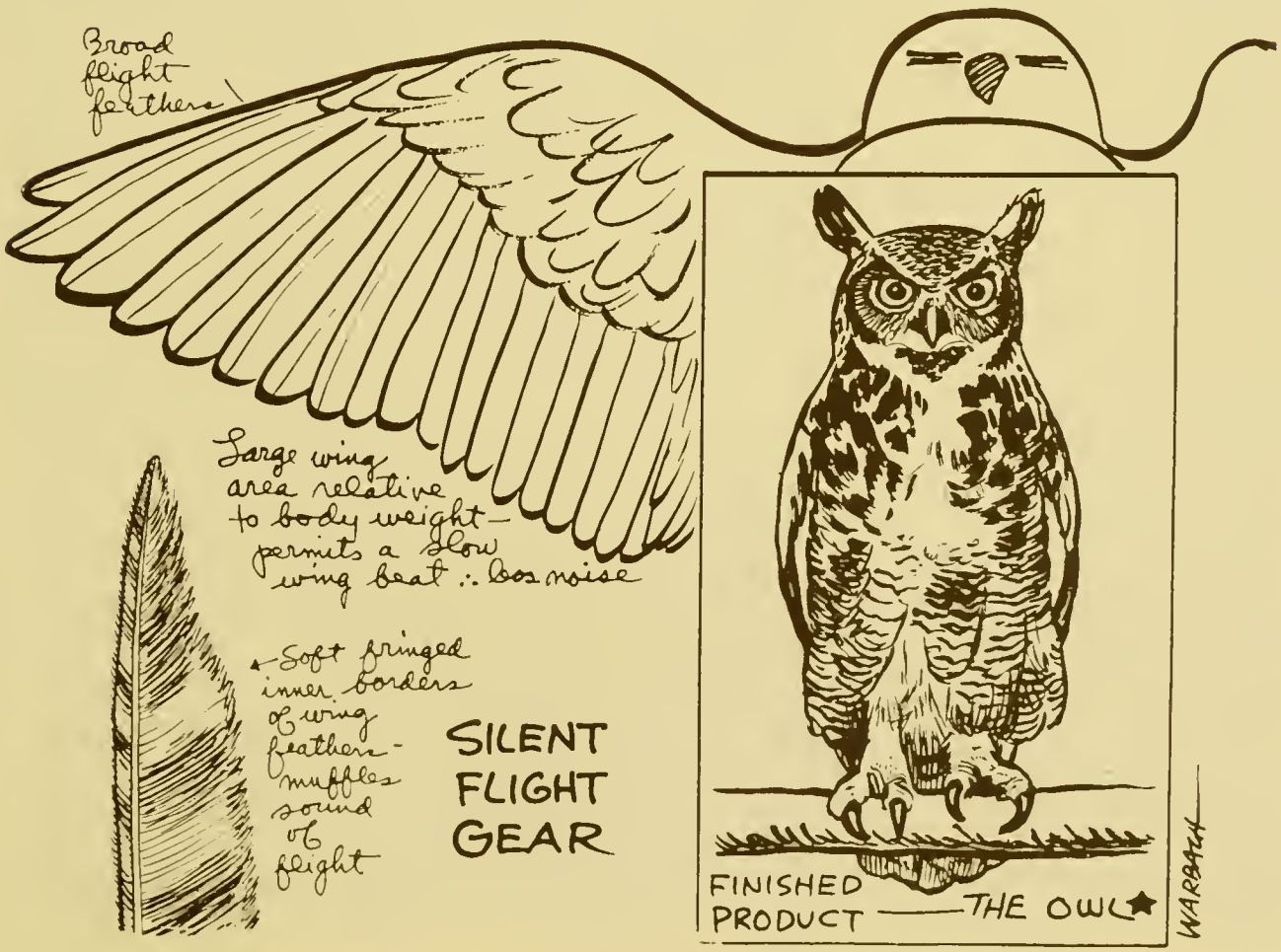
Have eyes face forward - better for depth perception

GRASPING EQUIPMENT

Area covered by outspread feet large enough to allow small margin of error in locating mouse.


Ears bigger than eyes
EAR OPENING
EAR OPENING
Both ears face forward for bi-aural reception.
In some models, one ear opening will be lower than the other - for better direction sensing.
opening to inner ear
Cover ear openings with fluffy feathers to better allow sound through
Left ear with inner ear opening in lower chamber; right ear will have opening in upper chamber — this will aid in locating source of sound.

3-D SOUND SENSOR


Broad flight feathers
Large wing area relative to body weight — permits a slow wing beat ∴ less noise
Soft fringed inner borders of wing feathers - muffles sound of flight
FINISHED PRODUCT — THE OWL
WARBACK

SILENT FLIGHT GEAR

editorial

ENVIRONMENTAL INFORMATION CENTER

As you read this, coal companies relentlessly strip black gold from eastern Montana, developers envision Montana as a recreational home paradise, energy firms build polluting power plants, transmission lines spread across the state like spider webs, bulldozers transform living streams into dying ditches . . . and more. Yes, many environmentally destructive practices are already well-entrenched, and more are on the way. Or, in short, Montana is at the crossroads.

Will we take the path to sensible use of our natural resources or will we go "the other way"? In Helena, a small group of concerned citizens is working hard to make that decision "sensible."

The Environmental Information Center has become the first Capitol-based clearinghouse of information on environmental issues and year-round watchdog of the legislature and state agencies.

Specifically, the center will:

- provide information on legislation and agency activities,
- furnish places to stay for out-of-town visitors,
- research, analyze and closely follow legislation,
- monitor floor and committee action during the legislature,
- prepare a weekly newsletter during the session,
- operate a statewide telephone network to immediately relay crucial developments to the public,
- coordinate legislative hearings and visits from legislators' constituents,
- work with the legislators themselves,
- monitor agency files,
- attend board and commission meetings and
- establish evidence files on issues which could be debated in the legislature.

It's a big job and that's probably why it was never done before. In past years, *one man* carried the environmental message to the legislature. (In 1973, he was joined by two others.) Until now, *nobody* watched administrative activities year-round.

About 25 Helenans—all volunteers—make up the center's staff. But the center still needs help to operate, maintain an office, publish and mail a newsletter and, in general, to remain the public's arm in daily decisions made in the Capitol. They could also use participation in the telephone network or assistance at the center.

If you ever worry about maintaining a quality environment and wonder what you can do, here's your chance.

Call the center at 443-2520 or write to Environmental Information Center, Box 12; Helena, MT 59601.

NORTHERN PLAINS RESOURCE COUNCIL

At the risk of being repetitive, we will mention another conservation organization. Or, better yet, consider the views of Montana's senators.

First Sen. Mike Mansfield put it like this: "The Northern Plains Resource Council has been a most valuable instrument in our continuing effort to prevent strip mining of vast areas of eastern Montana." And, following suit, Sen. Lee Metcalf stated, "It is no exaggeration to say that the Northern Plains Resource Council is the single most important and effective nongovernment body now operating in the plains region in behalf of resource protection. I sincerely hope its operations can be expanded to keep pace with the even faster growing threat to our natural heritage."

The NPRC has already left its mark on coal, energy and water policies in eastern Montana and neighboring plains states. In Helena, the NPRC's lobbyists were instrumental in passage of important coal- and water-related legislation.

NPRC also recognizes the cold fact that laws are only as good as their enforcement. So it has joined and initiated several suits to make sure laws were enforced. The Council has a rich research bank on all matters related to coal development and provides this information to the public. And, last, the NPRC members "watch" and when they see something wrong, the proper individuals and agencies hear about it promptly.

In many ways, NPRC differs from the Environmental Information Center—older and wiser perhaps. But in more ways, they are alike. Both are dedicated to keeping the Montana way of life for future generations.

Certainly, NPRC has the same money and manpower problems as EIC. Or, as they see it, "We have been working on a 'bare bones' budget; every penny is accounted for and goes miles."

Are you concerned about resource management, and especially coal development? If so, here's a chance to get into the action. For more information, write Northern Plains Resource Council, 421 Stapleton Bldg.; Billings, MT 59101.

singing a song for unsung wildlife

The white-tailed jackrabbit. F&G photo

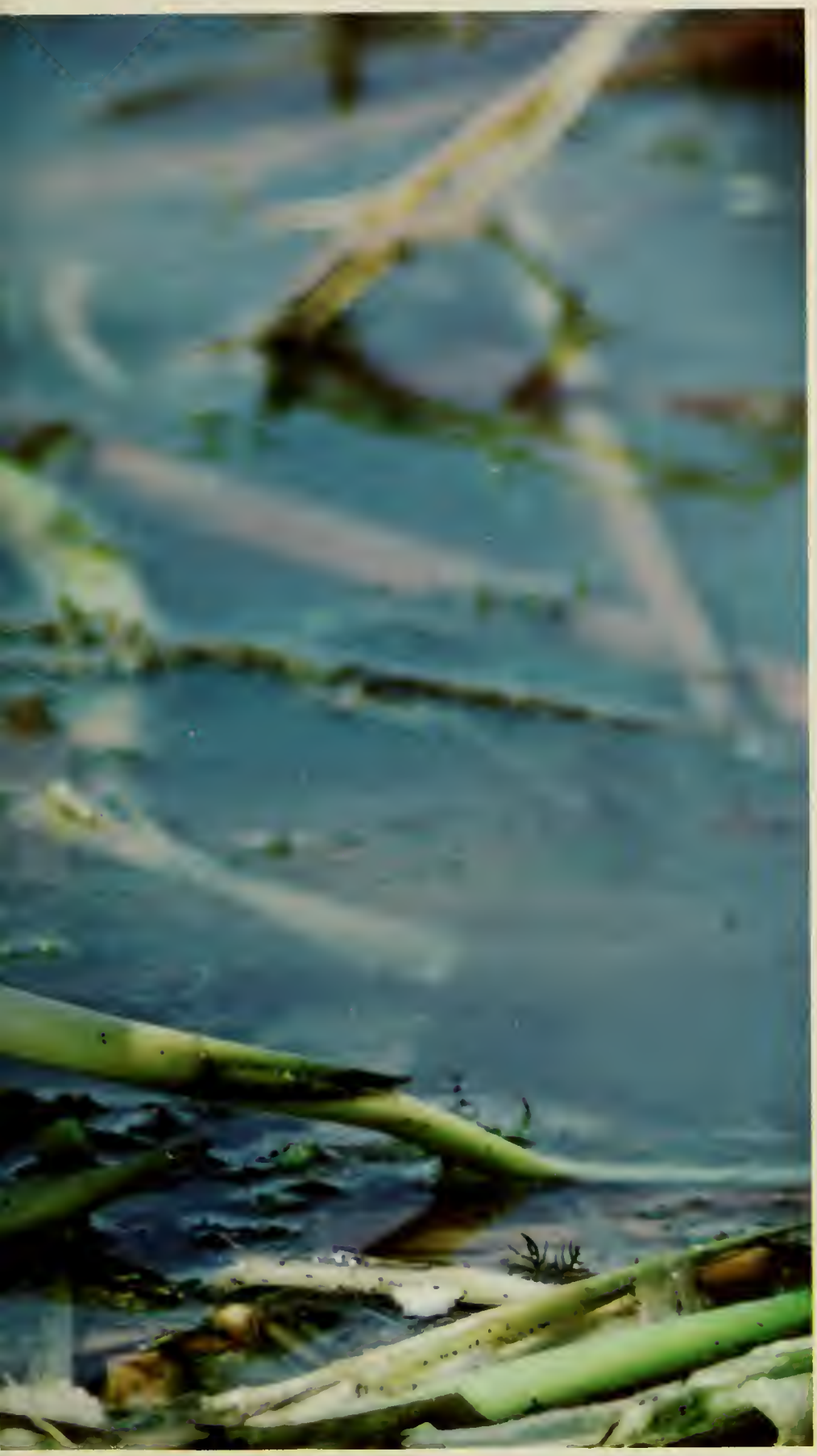
We know that some readers get tired of frequent breast-beating concerning the state's rich game bounty. Granted, on the eve of the season opening, our hunters invariably spend restless nights, springing from warm sheets three hours before routine. And few of our tables remain yearly bare of wild meat.

The joyful pursuit of sport hunting goes on and on. It always has, and hopefully, always will. The sport is a "consumptive," yet harmless, use of a renewable natural resource—wildlife. This time, however, we want to devote words to the "nonconsumptive" use of wildlife and "unsung" wild animals.

What are "nonconsumptive" uses? There are many—bird watching, sightseeing, painting, listening to distant-bound geese flying overhead, nature photography, inspecting a grizzly track along a wild river—to name only a few.

continued

The muskrat in its daily pursuit of food. photo by Alan Nelson



Who are the "unsung" animals? In this designation lie most animals. Ask a youngster, however, to name a wild animal and most likely he will first refer to some popular game species. Even our five-words-per-page baby books feature traditionally popular game animals—deer, lions, bears, ducks and geese, etc.—much more than the "unsung" ones. Thus, our young people unknowingly grow up preferring game animals. But what of the muskrat, raccoon, jackrabbit, the sora rail, the gull, skunk, the falcon and others? They *do* mean something. Don't they?

A few brave economists have attempted to put a price tag on wildlife. One recently concluded a bull elk was worth $1,600 to the economy. What was that same elk worth to those who enjoyed seeing it in its natural setting or following its tracks down a mountain trail or simply "knowing" it haunted nearby forests?

With nongame wildlife, such price tagging becomes even more risky. How much would someone—young or old—pay to see a fisher, a pine marten, a grebe, a marmot or a wolverine—especially if they've never viewed one before?

Ask a new father how much it's worth to have his young son see his first

continued

The cedar waxwing. F&G photo by Robert Rothweiler

The porcupine. F&G photo by Bill Schneider

California gulls. F&G photo

Barn swallows collecting mud for their nests. photo by Jon Cates

eagle, and perhaps awkwardly utter a semblance of the word into Daddy's delighted ear? Dad might stutter something about how he enjoyed explaining eagles to his eager youngster. "It only happens once, you know," he might conclude.

Should households pay for songbirds to brighten dull days? Would the birds be missed? How much would their return be worth? How many backyard bird feeders does this nation have?

Can Mother Nature charge farmers for the mousing habits of her owls, hawks, foxes and other rodent catchers?

All wild animals—and especially rare ones—have an inherent value as indicators of a quality (or a despoiled) environment. Certainly, it is worth something when they inform us of worsening surroundings.

In pursuing answers to these questions, it's easy to appreciate indefinable value. But one question we do have to answer is, "What are we specifically doing to improve and enhance the welfare of nonhunted wildlife?" Very little.

This creates cause for concern. Certainly, nonhunted wildlife benefits from programs geared for game habitat improvement or protection. Nongame

continued

The unloved magpie. F&G photo

The sora rail, seldom seen in Montana. F&G photo by Steve Bayless

The raccoon. photo by Jerry Manley

animals thus have become the "poor cousins" of game species. They profit from game management programs, but only accidentally. Until recently, state conservation agencies sponsored very few (if any) projects solely for the welfare of nongame wildlife.

To boost their sport, sportsmen pour millions into game management programs. The money mostly comes from license fees and special excise taxes on sporting arms. Needless to say, most game populations have prospered because of it.

However, nonhunted wildlife has never been the object of a multimillion dollar conservation program. And, of course, most nongame populations have not prospered because of it.

A highly regarded wildlife authority, Dr. Joe Linduska, put it quite appropriately when he said, "It is said that the bluebird is declining in numbers and is in trouble. That is a sad state of affairs. But it would probably not be so if the bluebird weighed three pounds and held well to a pointing dog . . . ."

"In our view," agrees Daniel A. Poole, president of the Wildlife Management Institute, "the time is at hand for the nonhunter and the nonangler to begin to match his 'nonconsumptive' demands for fish and wildlife and their habitat with his money."

Although sound in theory, when actually moving Mr. Poole's suggestion into reality, some problems quickly become apparent. For example, how do you license a bird watcher? Or what pricing system would

The rare peregrine falcon feeding on a freshly killed pigeon. photo by Jon Cates

apply to painters and photographers for their creative masterpieces? Hunters conveniently must purchase licenses or tags. They can "take" game from the land with that permit. But nonhunters usually "just look." How can they be charged for it? Should they?

Several states feel they have found the solution. Some sell special conservation stamps on a voluntary basis, so anyone—hunter or nonhunter—can contribute to the conservation of nongame wildlife. They buy the stamps, and resulting income goes for some special project such as protecting important nesting sites or improving and acquiring vital nongame habitat.

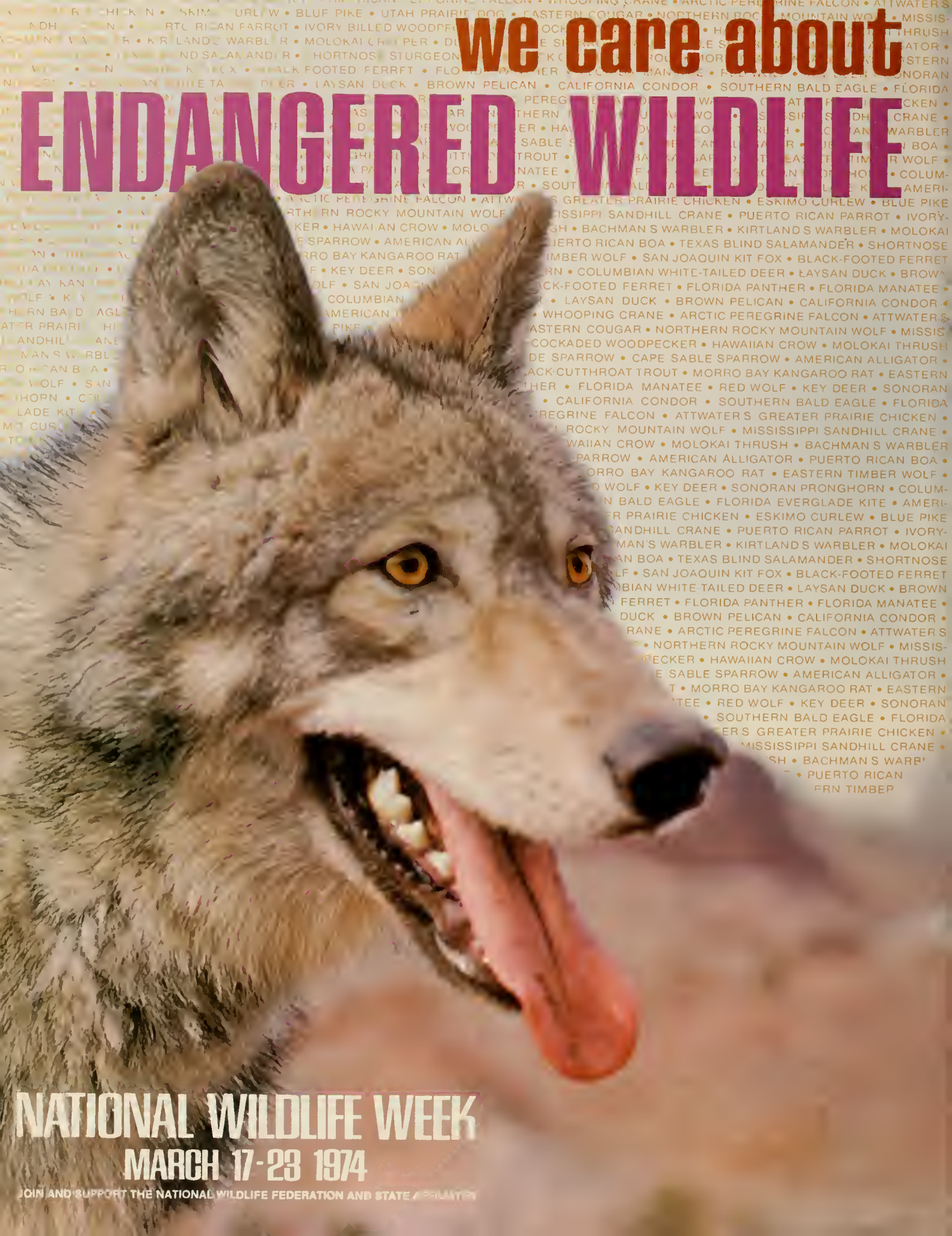
Washington sells personalized license plates on a voluntary basis. Car owners pay extra for the personalized plates and the money goes for nongame management. And Missouri hopes to tax soft drinks for the same purpose.

Oddly, though, hunters and nonhunters sometimes disagree and lash out at each other. In time, this only hinders their common goal—a secure future for all wildlife. Hunters must accept the nonhunter's right to "use" his game, just as the nonhunter must recognize and understand sport hunting. (Neither group, however, should tolerate unsportsmanlike or "slob" hunting activities such as private property damage, littering or game law violations.)

By combining forces, consumptive and nonconsumptive users (often the same people, incidentally) can do much more to curb threats to wildlife.

we care about

ENDANGERED WILDLIFE



NATIONAL WILDLIFE WEEK

MARCH 17-23 1974

JOIN AND SUPPORT THE NATIONAL WILDLIFE FEDERATION AND STATE